LOWREY D 300

MODEL

SERVICE MANUAL

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SERVICE MANUAL

MODEL TGS-1

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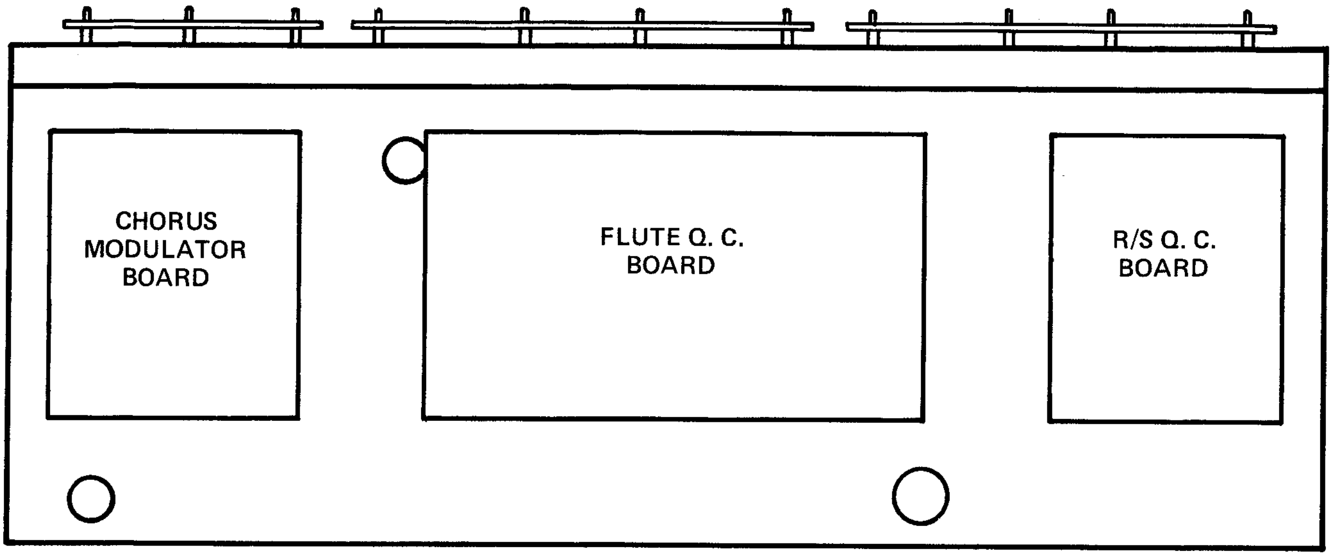
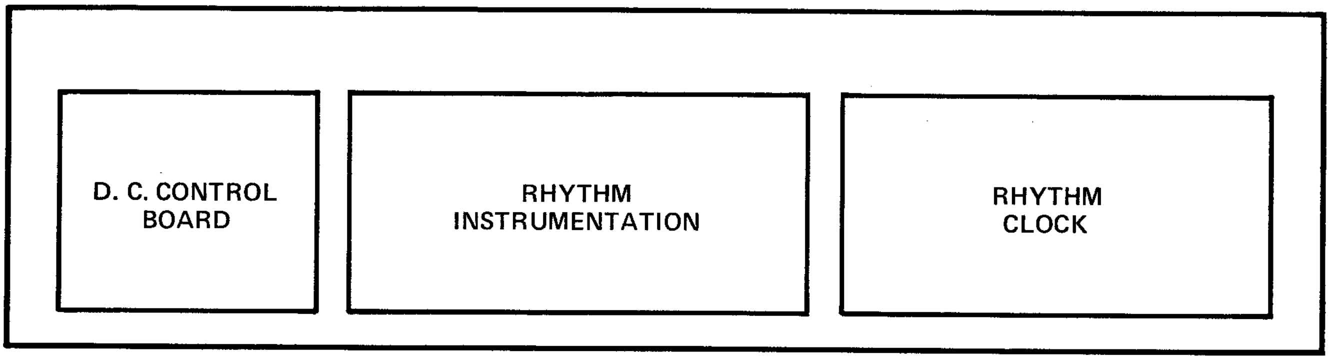
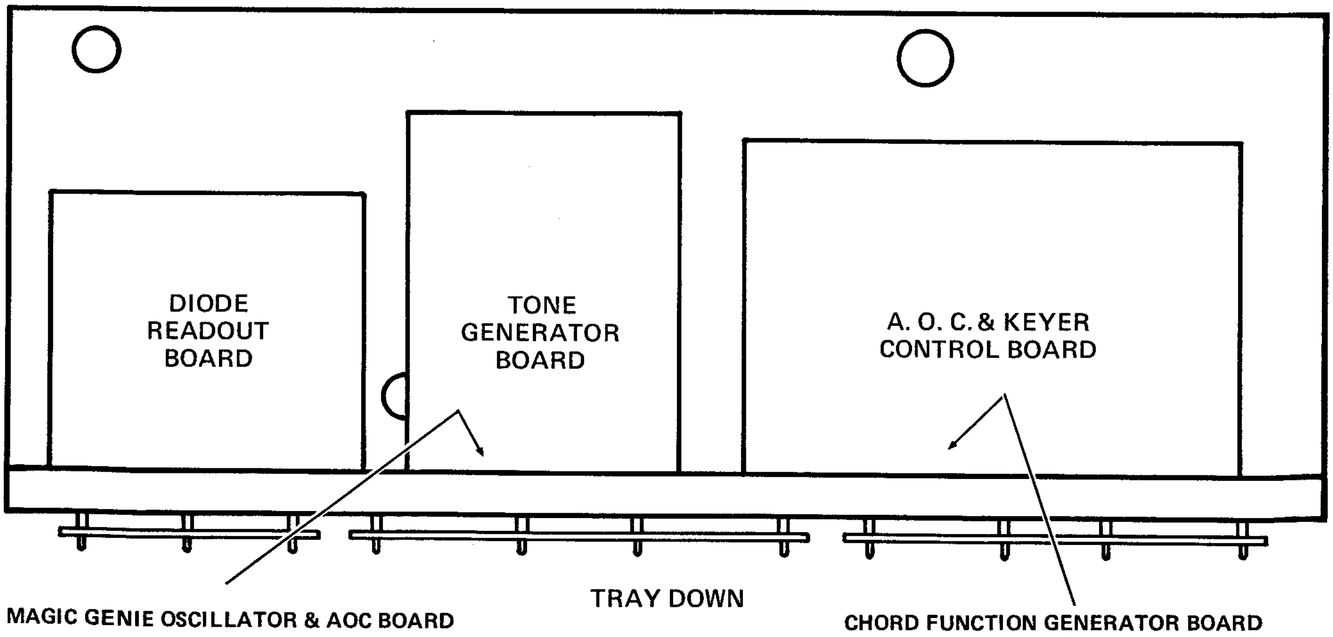
PRINTED CIRCUIT BOARD LOCATION


CHORUS MODULATOR BOARD
FLUTE Q. C. BOARD
R/S Q. C. BOARD

TRAY UP

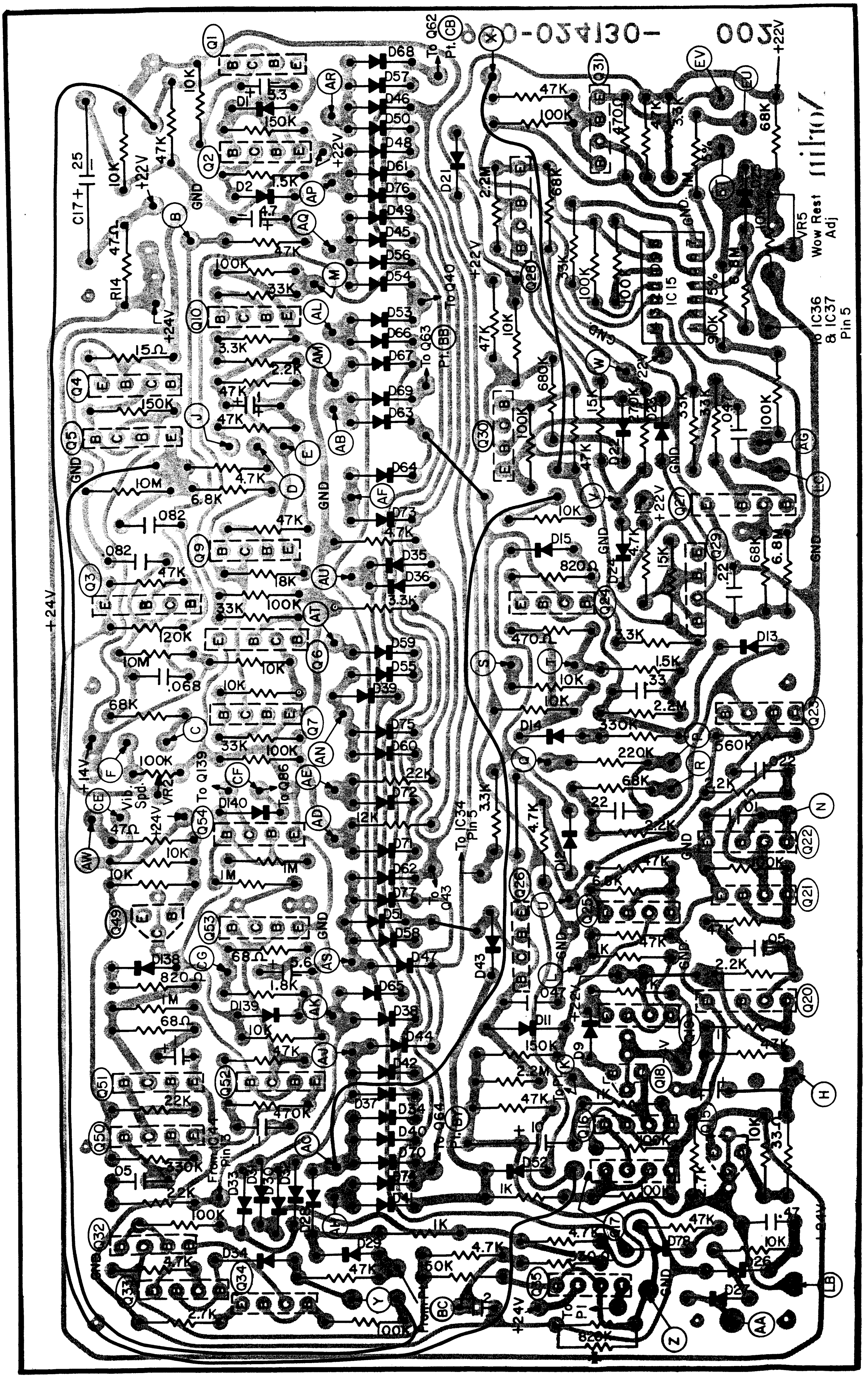

D. C. CONTROL BOARD
RHYTHM INSTRUMENTATION
RHYTHM CLOCK

TRAY TOP

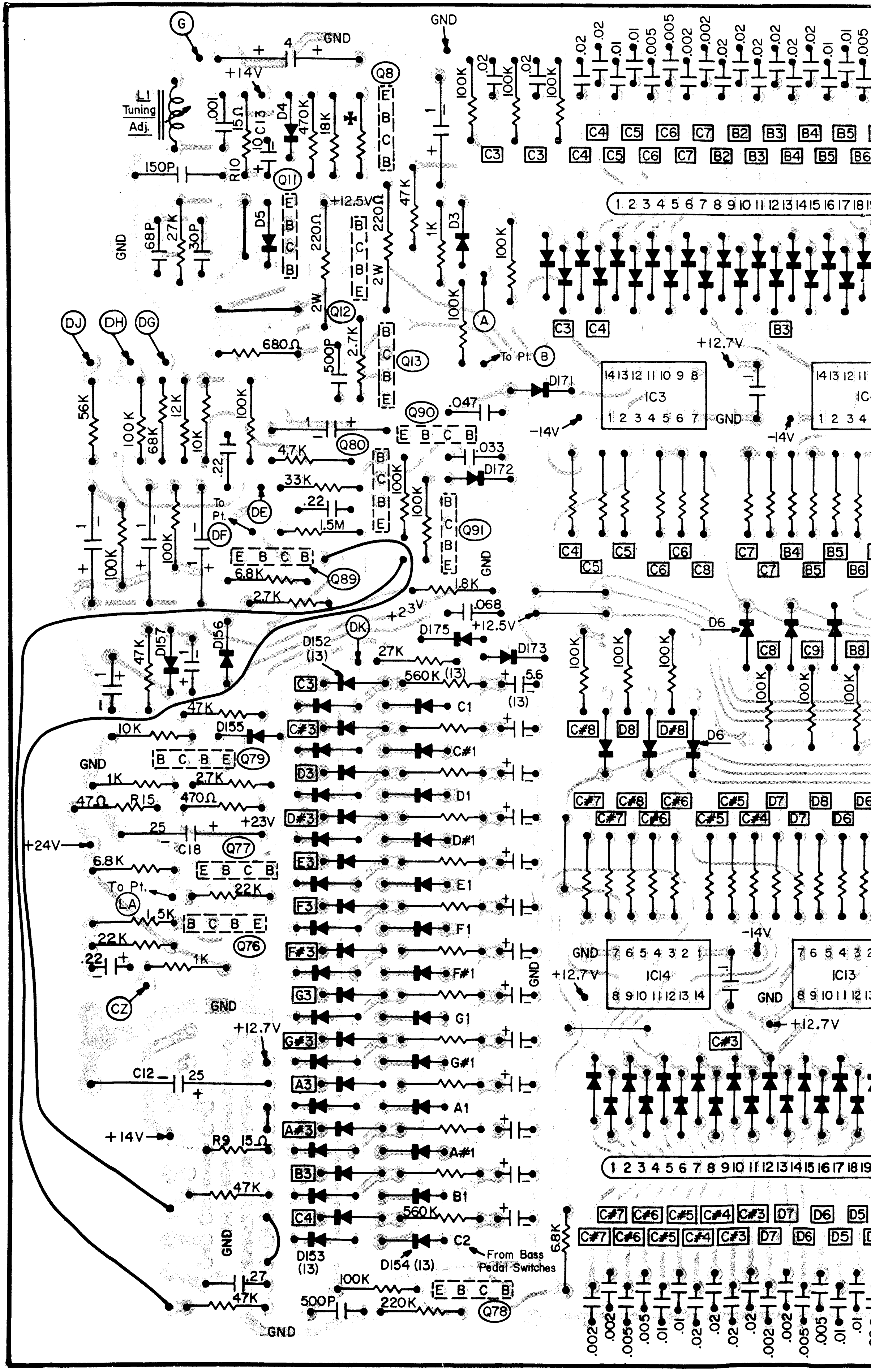

DIODE READOUT BOARD
TONE GENERATOR BOARD
A. O. C. & KEYER CONTROL BOARD
MAGIC GENIE OSCILLATOR & AOC BOARD
CHORD FUNCTION GENERATOR BOARD

TRAY DOWN

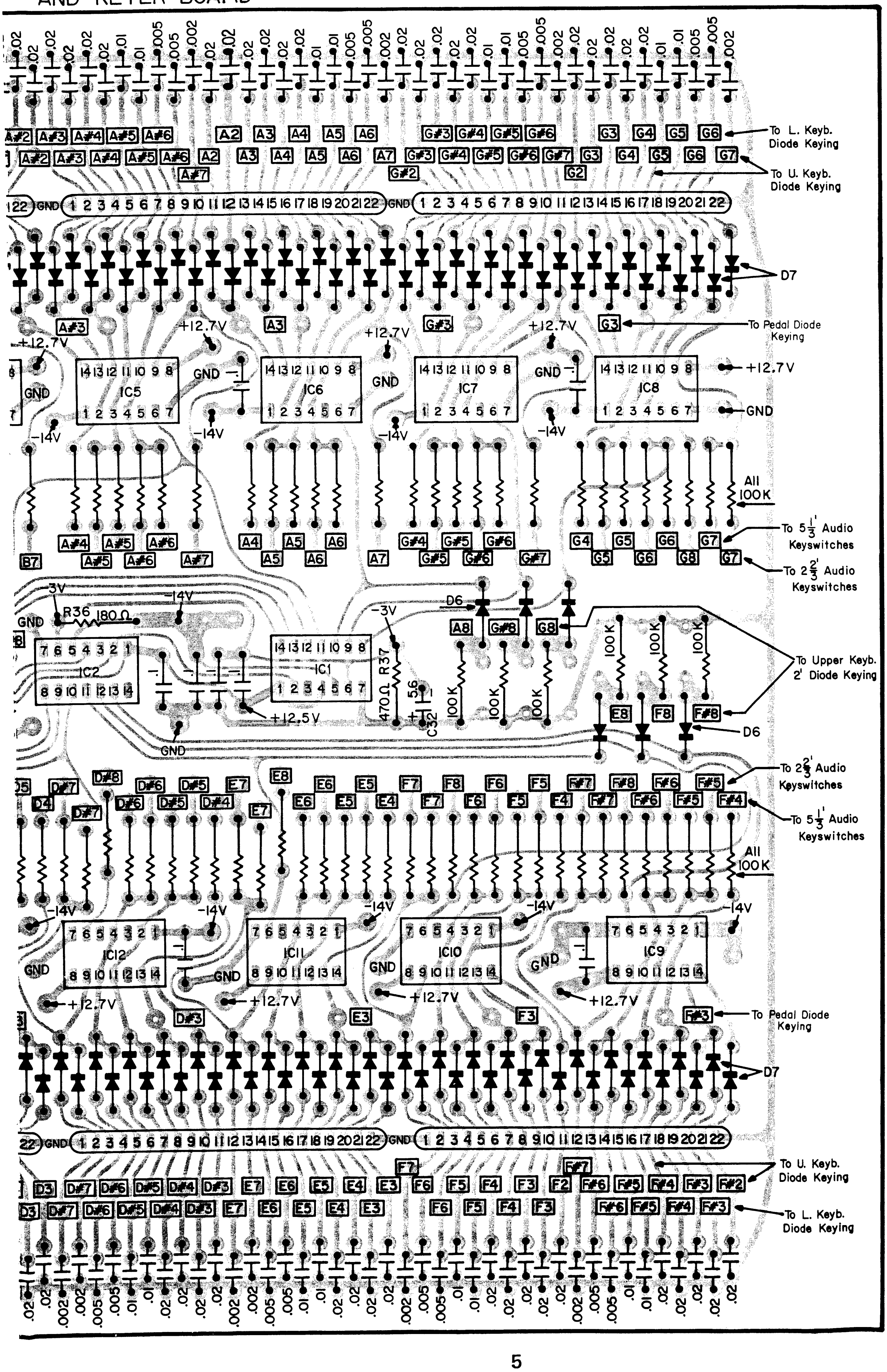
D. C. CONTROL BOARD


+24V
C17 + .25
10K
+22V
47K
GND
R14
47Ω
B
Q1
D1
5.3
150K
Q2
D2
1.5K
4.7
AP
AQ
AR
+22V
D68
D57
D46
D50
D48
D61
D76
D49
D45
D56
D54
D53
D66
D67
D69
D63
D64
D73
D35
D36
D59
D55
D39
D75
D60
D72
D71
D62
D77
D51
D58
D47
D65
D38
D44
D42
D37
D34
D40
D70
D74
D41
To Q62 Pt. CB
To Q40
To Q63 Pt. BB
To IC34 Pin 3
To Q43
To Q64
M
AL
AM
AB
AF
AU
AT
AN
AE
AD
AS
AK
AJ
AO
Q10
Q4
Q5
Q3
Q9
Q6
Q7
Q54
Q53
Q49
Q51
Q52
Q50
Q32
Q33
Q34
Q35
100K
33K
3.3K
2.2K
15Ω
150K
J
E
D
10M
6.8K
.082
18K
20K
.068
68K
C
F
+14V
CE
Vib. Spd.
VR2
To Q139
To Q86
CF
D140
AW
D138
CG
820
1M
68Ω
D139
1.8K
5.6
470K
22K
330K
.05
From IC14 Pin 15
D33
D28
D29
D34
Y
BC
2.7K
100K
X
D21
2.2M
68K
Q31
Q28
Q30
Q27
Q29
Q24
Q23
Q22
Q21
Q20
Q19
Q18
Q17
Q16
Q15
Q25
Q26
IC15
VR5
Wow Rest Adj
To IC36 & IC37 Pin 5
EV
EU
AG
LC
W
V
S
T
U
L
K
R
Q
N
H
Z
AA
LB
D15
D13
D14
D11
D9
D52
D78
D27
D43
D12
D24
D25
D22
820Ω
470Ω
330K
220K
560K
1K
.047
150K
To P1
820K
+24V
GND
+22V
P1
-L24V

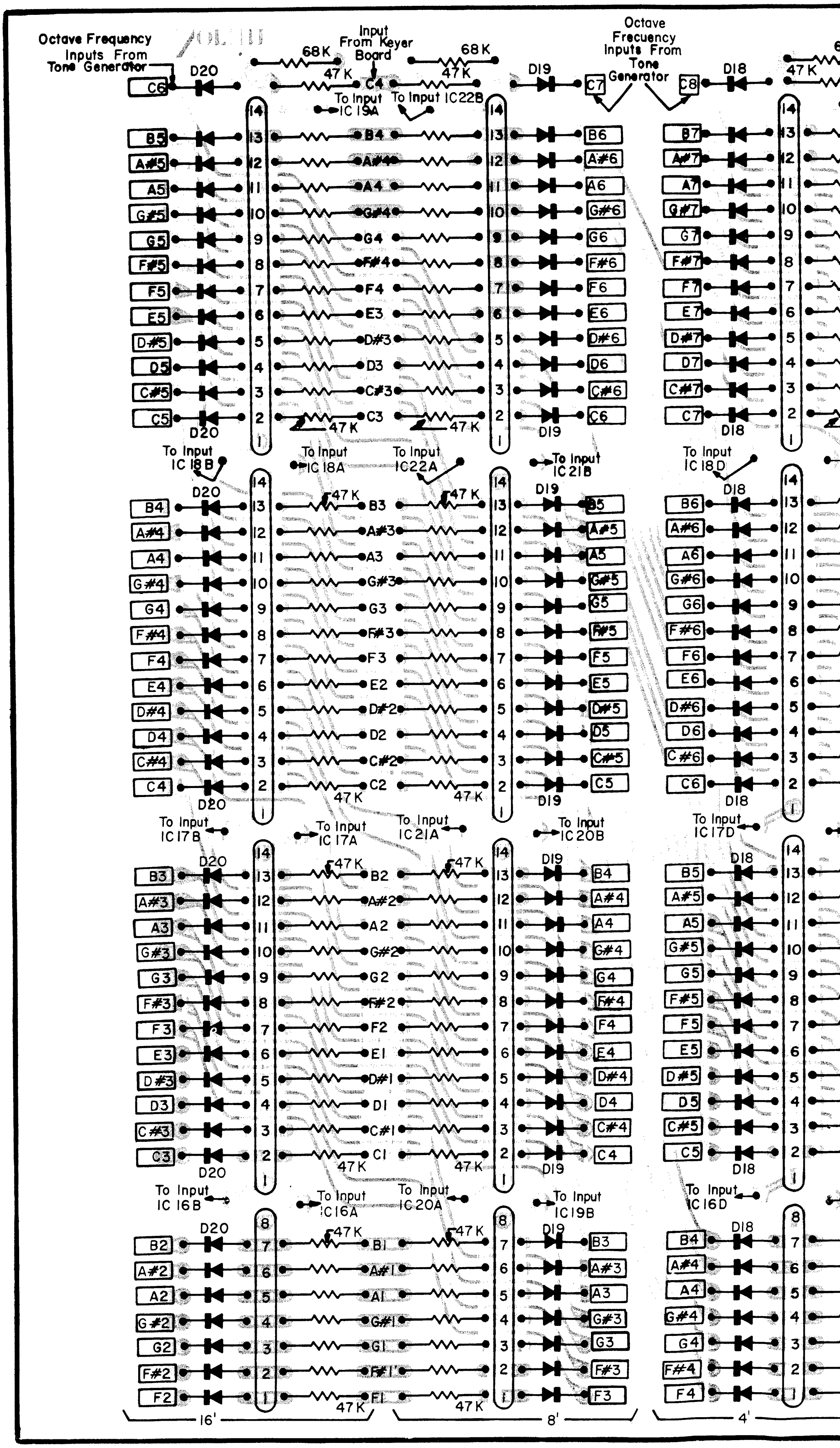
TONE GENERATOR


G
GND
+14V
4
L1 Tuning Adj.
.001
15Ω
10 C13
D4
470K
18K
Q8
E B C B
R10
Q11
150P
D5
+12.5V
220Ω
2W
Q12
GND
68P
27K
30P
47K
1K
D3
100K
A
To Pt. B
DJ
DH
DG
56K
68K
12K
10K
.22
680Ω
500P
2.7K
Q13
1
D171
Q90
.047
Q80
33K
.22
1.5M
.033
D172
To Pt. DE
DF
Q91
Q89
6.8K
2.7K
1.8K
.068
+23V
+12.5V
DK
D175
D173
D157
D156
D152 (13)
27K
560K (13)
5.6 (13)
C3
C#3
D3
D#3
E3
F3
F#3
G3
G#3
A3
A#3
B3
C4
C1
C#1
D1
D#1
E1
F1
F#1
G1
G#1
A1
A#1
B1
C2
D153 (13)
D154 (13)
From Bass Pedal Switches
10K
D155
Q79
B C B E
R15
47Ω
470Ω
25
C18
+23V
+24V
Q77
22K
To Pt. LA
1.5K
Q76
1K
CZ
+12.7V
C12
R9
15Ω
.27
100K
220K
500P
Q78
IC3
IC14
IC13
-14V
+12.7V
6.8K
D6
C4 C5 C6 C7 B2 B3 B4 B5 B6
C#7 C#6 C#5 C#4 C#3 D7 D6 D5
C8 C9 B8
C#8 D8 D#8
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
.02 .01 .005 .002

AND KEYER BOARD

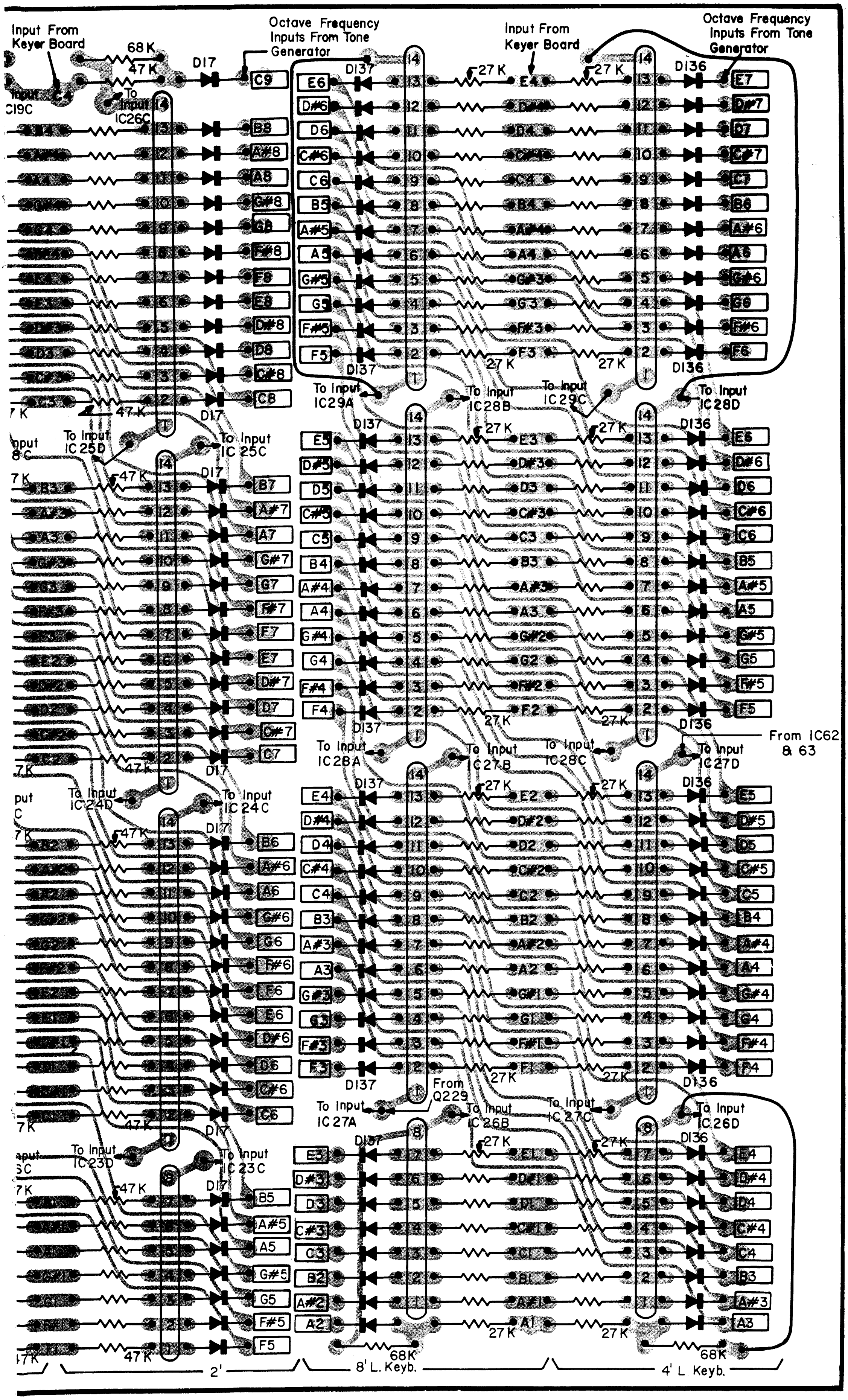

To L. Keyb. Diode Keying
To U. Keyb. Diode Keying
D7
To Pedal Diode Keying
+12.7V
GND
-14V
IC5
IC6
IC7
IC8
All 100K
To 5 1/3' Audio Keyswitches
To 2 2/3' Audio Keyswitches
-3V
R36 180Ω
IC2
IC1
R37 470Ω
5.6 C32
+12.5V
D6
100K
To Upper Keyb. 2' Diode Keying
A8
G#8
G8
E8
F8
F#8
To 2 2/3' Audio Keyswitches
To 5 1/3' Audio Keyswitches
All 100K
IC12
IC11
IC10
IC9
To Pedal Diode Keying
D7
GND 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
To U. Keyb. Diode Keying
To L. Keyb. Diode Keying
.02
.01
.005
.002

DIODE READOUT

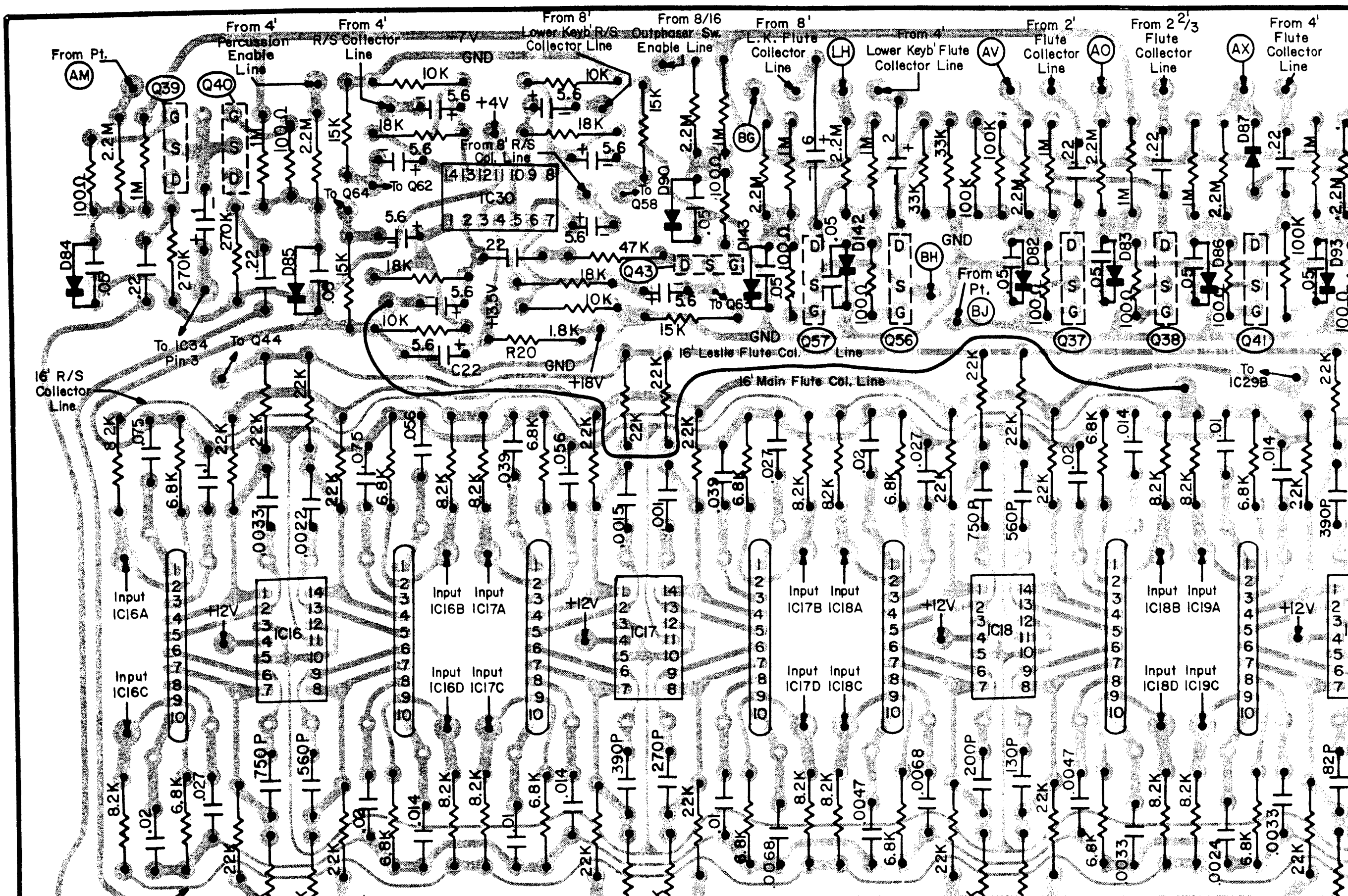


Octave Frequency Inputs From Tone Generator
Input From Keyer Board
Octave Frecuency Inputs From Tone Generator
68K
47K
D20
D19
D18
C6
C4
C7
C8
To Input IC 19A
To Input IC22B
To Input IC 18B
To Input IC 18A
To Input IC22A
To Input IC 21B
To Input IC 18D
To Input IC17B
To Input IC 17A
To Input IC 21A
To Input IC 20B
To Input IC 17D
To Input IC 16B
To Input IC16A
To Input IC 20A
To Input IC19B
To Input IC 16D
B5
A#5
A5
G#5
G5
F#5
F5
E5
D#5
D5
C#5
C5
B4
A#4
A4
G#4
G4
F#4
F4
E3
D#3
D3
C#3
C3
B6
A#6
A6
G#6
G6
F#6
F6
E6
D#6
D6
C#6
C6
B7
A#7
A7
G#7
G7
F#7
F7
E7
D#7
D7
C#7
C7
B3
A#3
A3
G#3
G3
F#3
F3
E2
D#2
D2
C#2
C2
C4
B2
A#2
A2
G#2
G2
F#2
F2
E1
D#1
D1
C#1
C1
E3
E4
D#4
D4
C#4
B1
A#1
A1
G#1
G1
F#1
F1
16'
8'
4'

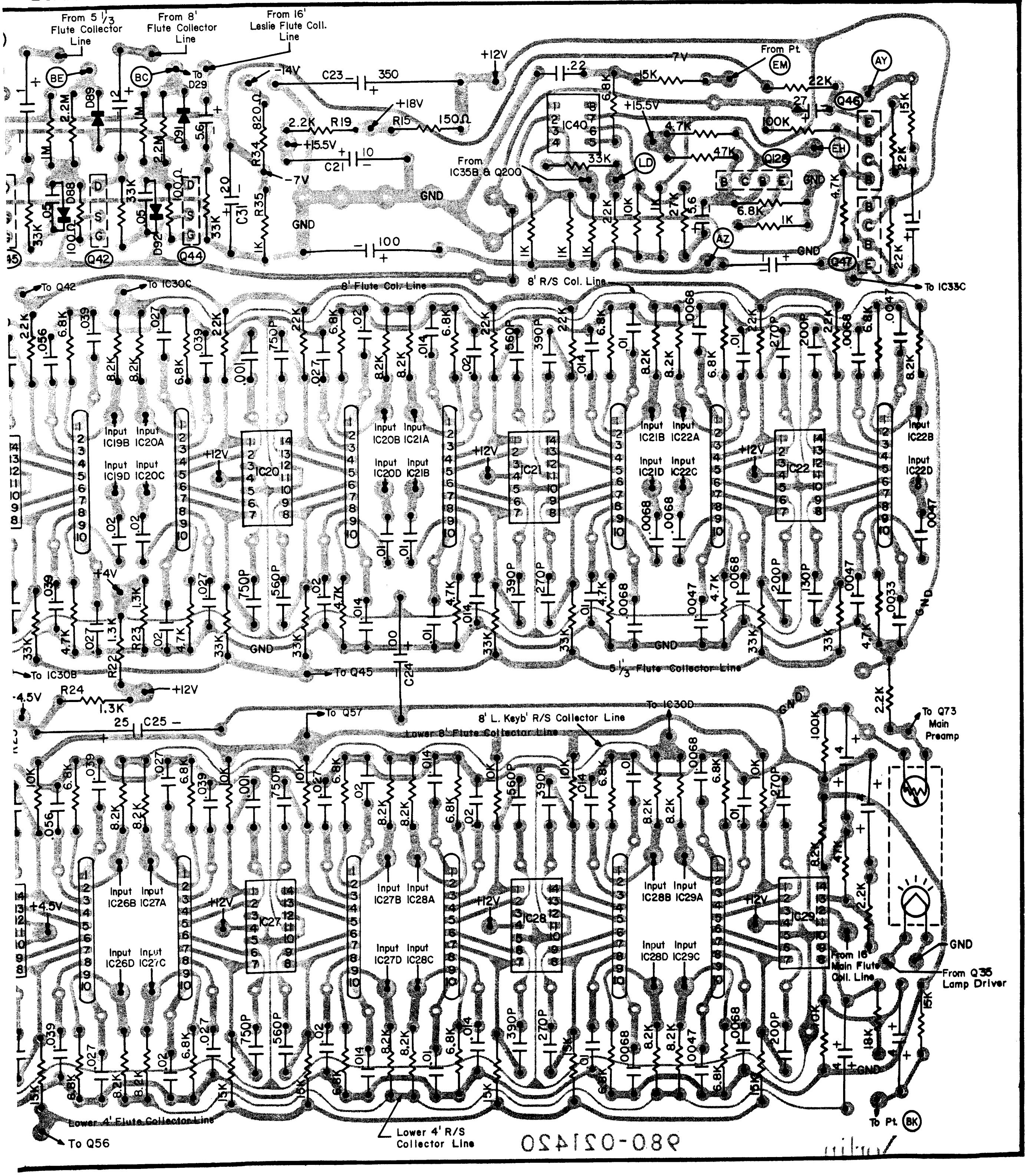
BOARD

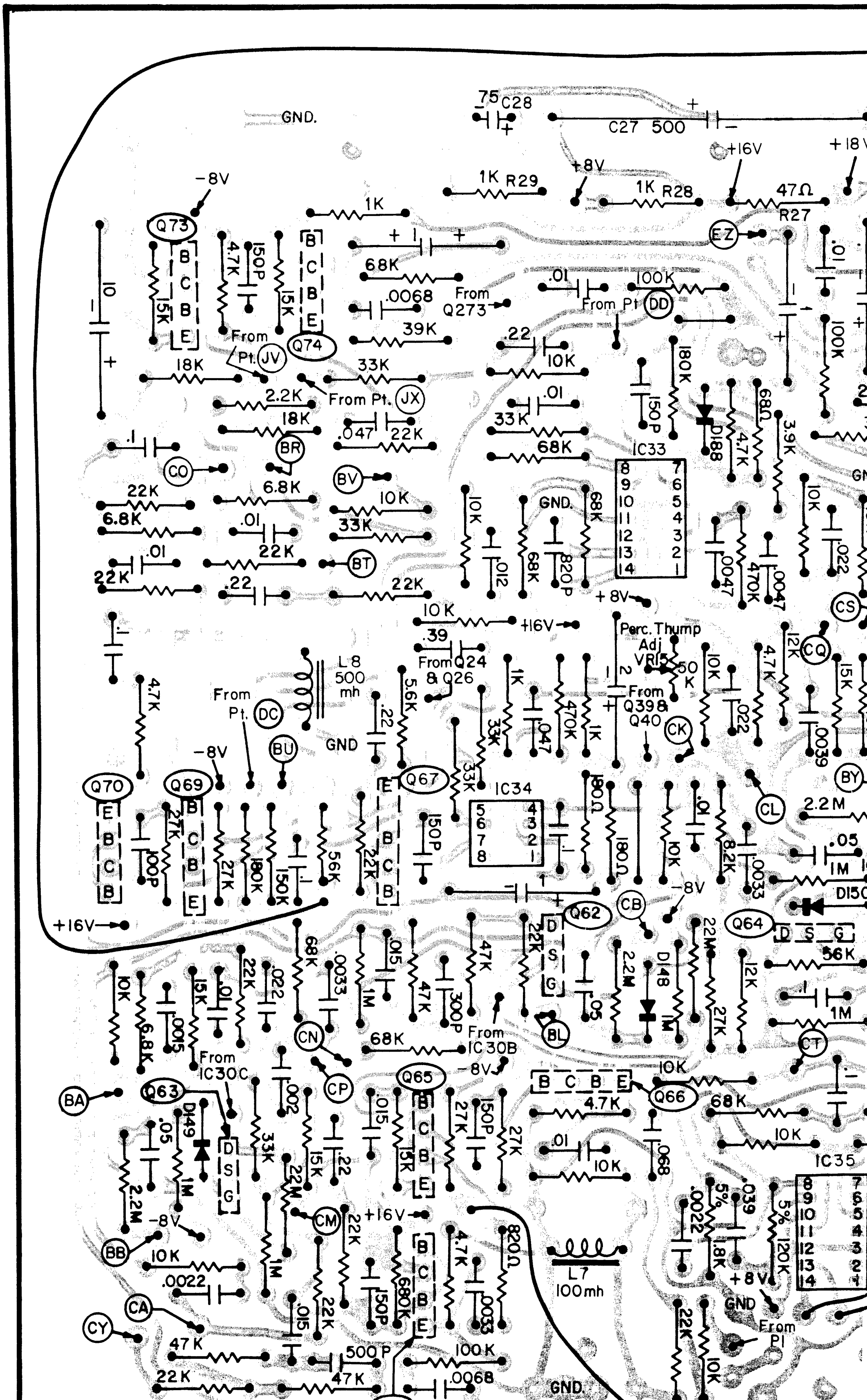

Input From Keyer Board
68 K
47 K
D17
C9
Octave Frequency Inputs From Tone Generator
Input From Keyer Board
27 K
D137
D136
To Input IC26C
CI9C
E6
D#6
D6
C#6
C6
B5
A#5
A5
G#5
G5
F#5
F5
E7
D#7
D7
C#7
C7
B6
A#6
A6
G#6
G6
F#6
F6
B8
A#8
A8
G#8
G8
F#8
F8
E8
D#8
D8
C#8
C8
E4
D#4
D4
C#4
C4
B4
A#4
A4
G#3
G3
F#3
F3
To Input IC29A
To Input IC28B
To Input IC29C
To Input IC28D
To Input IC25D
To Input IC25C
B7
A#7
A7
G#7
G7
F#7
F7
E7
D#7
D7
C#7
C7
E3
D#3
D3
C#3
C3
B3
A#3
A3
G#2
G2
F#2
F2
From IC62 & 63
To Input IC28A
To Input IC27B
To Input IC28C
To Input IC27D
To Input IC24D
To Input IC24C
B6
A#6
A6
G#6
G6
F#6
F6
E6
D#6
D6
C#6
C6
E2
D#2
D2
C#2
C2
B2
A#2
A2
G#1
G1
F#1
F1
E5
D#5
D5
C#5
C5
B4
A#4
A4
G#4
G4
F#4
F4
From Q229
To Input IC27A
To Input IC26B
To Input IC27C
To Input IC26D
To Input IC23D
To Input IC23C
B5
A#5
A5
G#5
G5
F#5
F5
E3
D#3
D3
C#3
C3
B2
A#2
A2
E1
D#1
D1
C#1
C1
B1
A#1
A1
E4
D#4
D4
C#4
C4
B3
A#3
A3
68K
2'
8' L. Keyb.
4' L. Keyb.

FLUTE FILTER

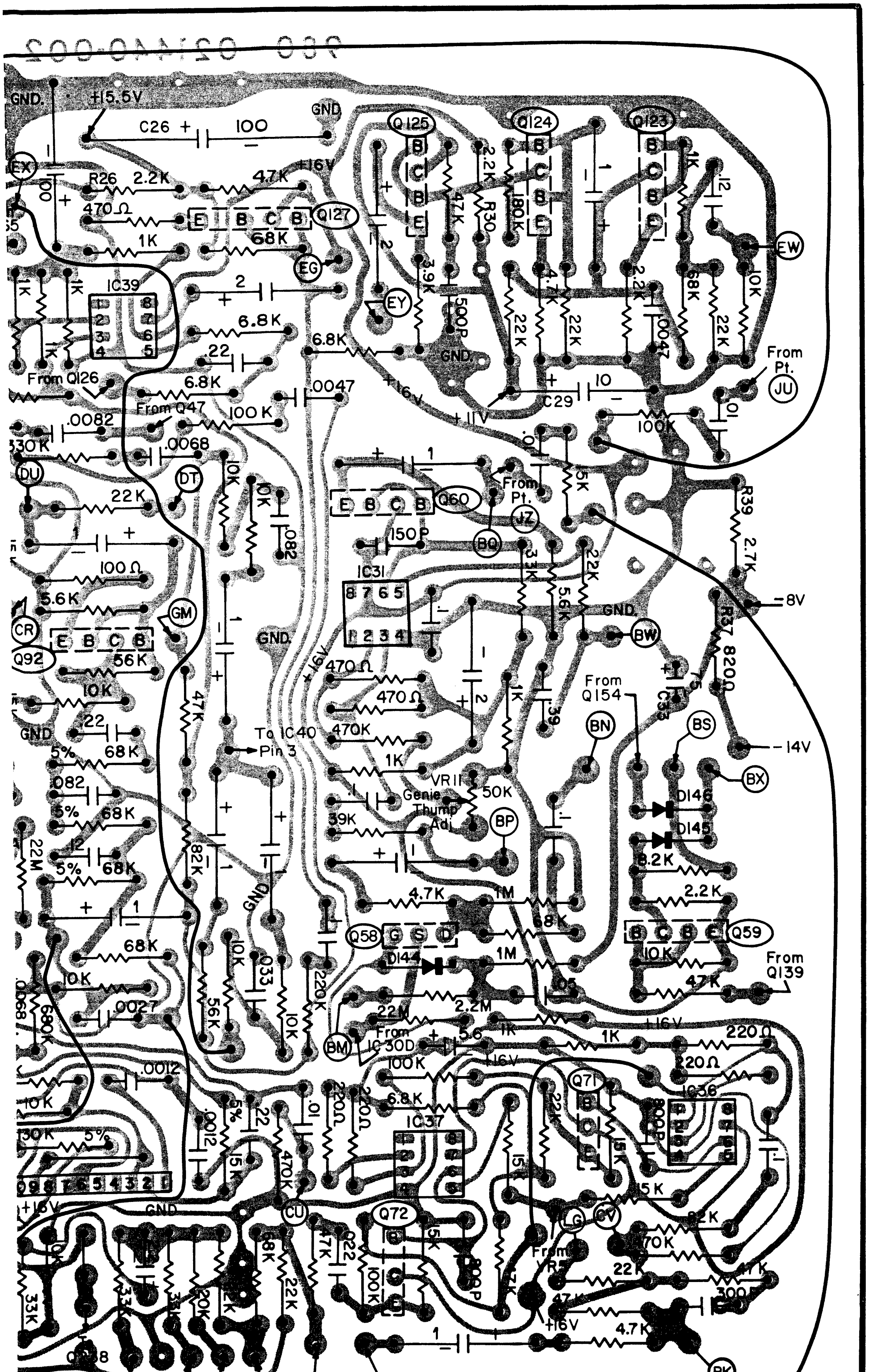

From Pt. AM
From 4' Percussion Enable Line
From 4' R/S Collector Line
From 8' Lower Keyb' R/S Collector Line
From 8/16 Outphaser Sw. Enable Line
From 8' L.K. Flute Collector Line
LH
From 4' Lower Keyb' Flute Collector Line
AV
From 2' Flute Collector Line
AO
From 2 2/3 Flute Collector Line
AX
From 4' Flute Collector Line
Q39
Q40
+7V
GND
+4V
From 8' R/S Col. Line
IC30
To Q64
To Q62
To Q58
BG
D90
D143
D142
Q43
To Q63
From Pt. BJ
BH
D82
D83
D86
D87
D93
D84
D85
Q57
Q56
Q37
Q38
Q41
To IC34 Pin 3
To Q44
R20
C22
+18V
+13.5V
16' Leslie Flute Col. Line
16' Main Flute Col. Line
To IC29B
16' R/S Collector Line
Input IC16A
Input IC16C
IC16
Input IC16B
Input IC17A
Input IC16D
Input IC17C
IC17
Input IC17B
Input IC18A
Input IC17D
Input IC18C
IC18
Input IC18B
Input IC19A
Input IC18D
Input IC19C
+12V
4' R/S Collector Line
4' Flute Collector Line
4' Percussion Collector Line
Harmonic 2 2/3 Collector Line
2 2/3 Flute Collector Line
To Q41
To Q38
Input IC23A
Input IC23C
IC23
Input IC23B
Input IC24A
Input IC23D
Input IC24C
IC24
Input IC24B
Input IC25A
Input IC24D
Input IC25C
IC25
Input IC25B
Input IC26A
Input IC25D
Input IC26C
2' Flute Collector Line
To Q37

BOARD

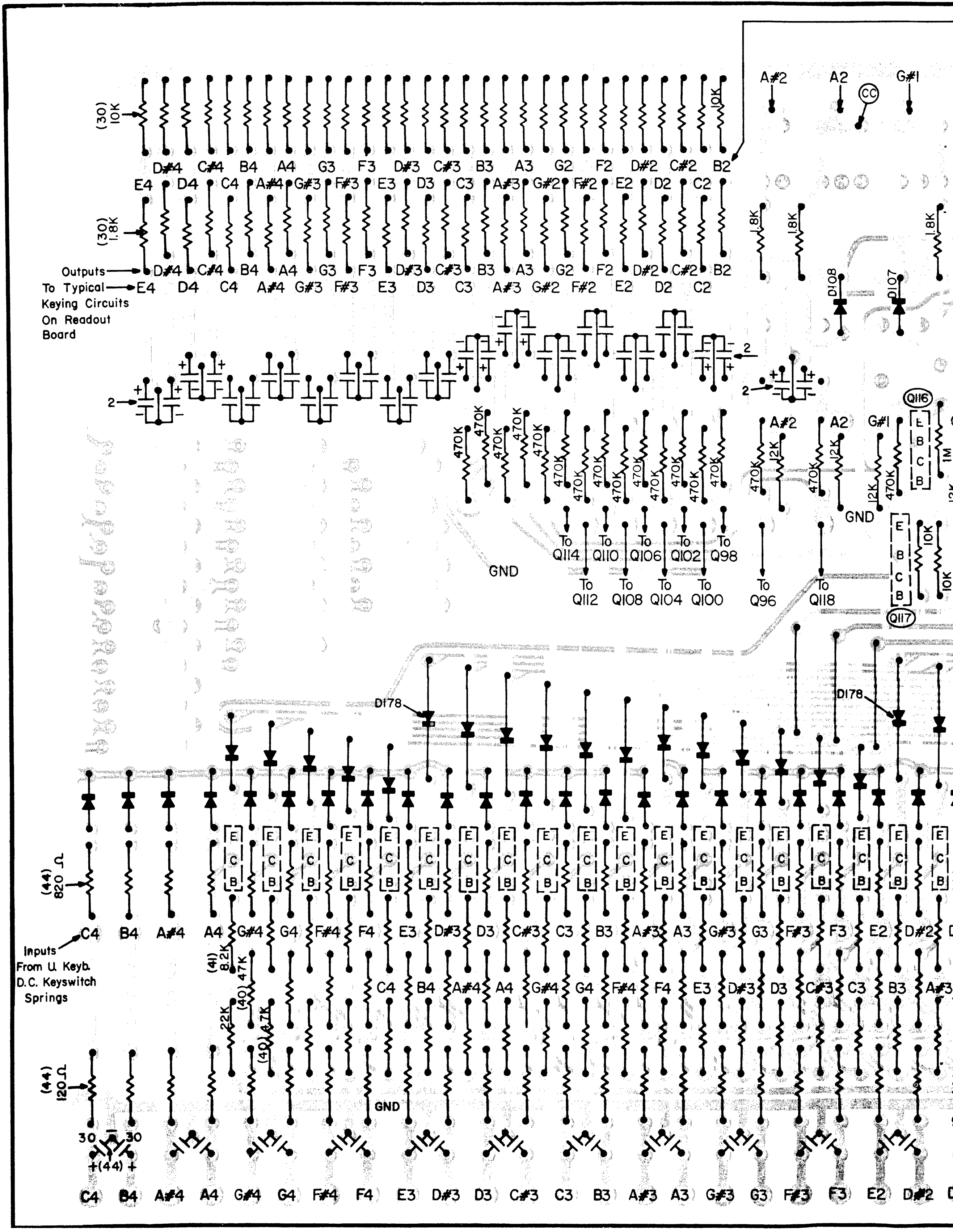

From 5 1/3 Flute Collector Line
From 8' Flute Collector Line
From 16' Leslie Flute Coll. Line
To D29
-14V
C23
350
+12V
.22
-7V
From Pt. EM
AY
15K
22K
Q46
27
100K
+15.5V
IC40
4.7K
47K
EH
Q126
LD
33K
From IC35B & Q200
+18V
2.2K
R19
R15
150Ω
+15.5V
10
C21
820Ω
R34
-7V
R35
C31
20
GND
100
AZ
Q47
BE
BC
2.2M
D89
D91
D88
D92
100Ω
Q42
Q44
5.6
6.8K
1K
To Q42
To IC30C
8' Flute Col. Line
8' R/S Col. Line
To IC33C
Input IC19B
Input IC20A
Input IC19D
Input IC20C
IC20
Input IC20B
Input IC21A
Input IC20D
Input IC21B
IC21
Input IC21B
Input IC22A
Input IC21D
Input IC22C
IC22
Input IC22B
Input IC22D
+12V
+4V
R23
R22
GND
To IC30B
To Q45
C24
5 1/3 Flute Collector Line
-4.5V
R24
1.3K
+12V
25
C25
To Q57
8' L. Keyb' R/S Collector Line
To IC30D
Lower 8' Flute Collector Line
To Q73 Main Preamp
Input IC26B
Input IC27A
Input IC26D
Input IC27C
IC27
+4.5V
Input IC27B
Input IC28A
Input IC27D
Input IC28C
IC28
Input IC28B
Input IC29A
Input IC28D
Input IC29C
IC29
From 16' Main Flute Coll. Line
GND
From Q35 Lamp Driver
Lower 4' Flute Collector Line
To Q56
Lower 4' R/S Collector Line
To Pt. BK
980-021420


GND.
.75 C28
C27 500
1K R29
+8V
1K R28
+16V
+18V
47Ω R27
-8V
Q73
B C B E
4.7K
150P
15K
1K
68K
.0068
From Q273
39K
.01
100K
From Pt DD
From Pt. JV
Q74
18K
33K
2.2K
From Pt. JX
.22
10K
18K
.047
22K
BR
CO
6.8K
BV
10K
33K
.01
22K
BT
22K
6.8K
IC33
180K
150P
D188
68Ω
4.7K
3.9K
.012
68K
820P
GND.
.0047
470K
.0047
.022
+8V
CS
CQ
Perc. Thump Adj VR15 50 K
From Q39 & Q40
CK
L8 500 mh
From Pt. DC
BU
GND
-8V
.39
From Q24 & Q26
5.6K
.22
Q67
1K
470K
.047
33K
IC34
150P
180Ω
2.2M
CL
BY
.05
1M
D150
Q70
Q69
E B C B
100P
27K
180K
150K
56K
.0033
8.2K
+16V
Q62
CB
D S G
Q64
56K
2.2M
D148
22M
12K
27K
1M
.05
10K
6.8K
.0015
.01
15K
.022
.0033
.015
47K
300P
From IC30B
CN
68K
BL
CT
From IC30C
BA
Q63
D149
.002
CP
Q65
.015
150P
27K
Q66
4.7K
.01
.068
IC35
33K
22M
15K
.22
.0022
5%
.039
1.8K
120K
+8V
GND
From Pt
2.2M
1M
-8V
BB
CM
+16V
680K
4.7K
820Ω
L7 100mh
.0033
.0022
CA
CY
47K
.015
500P
100K
.0068
22K
Q68
GND.

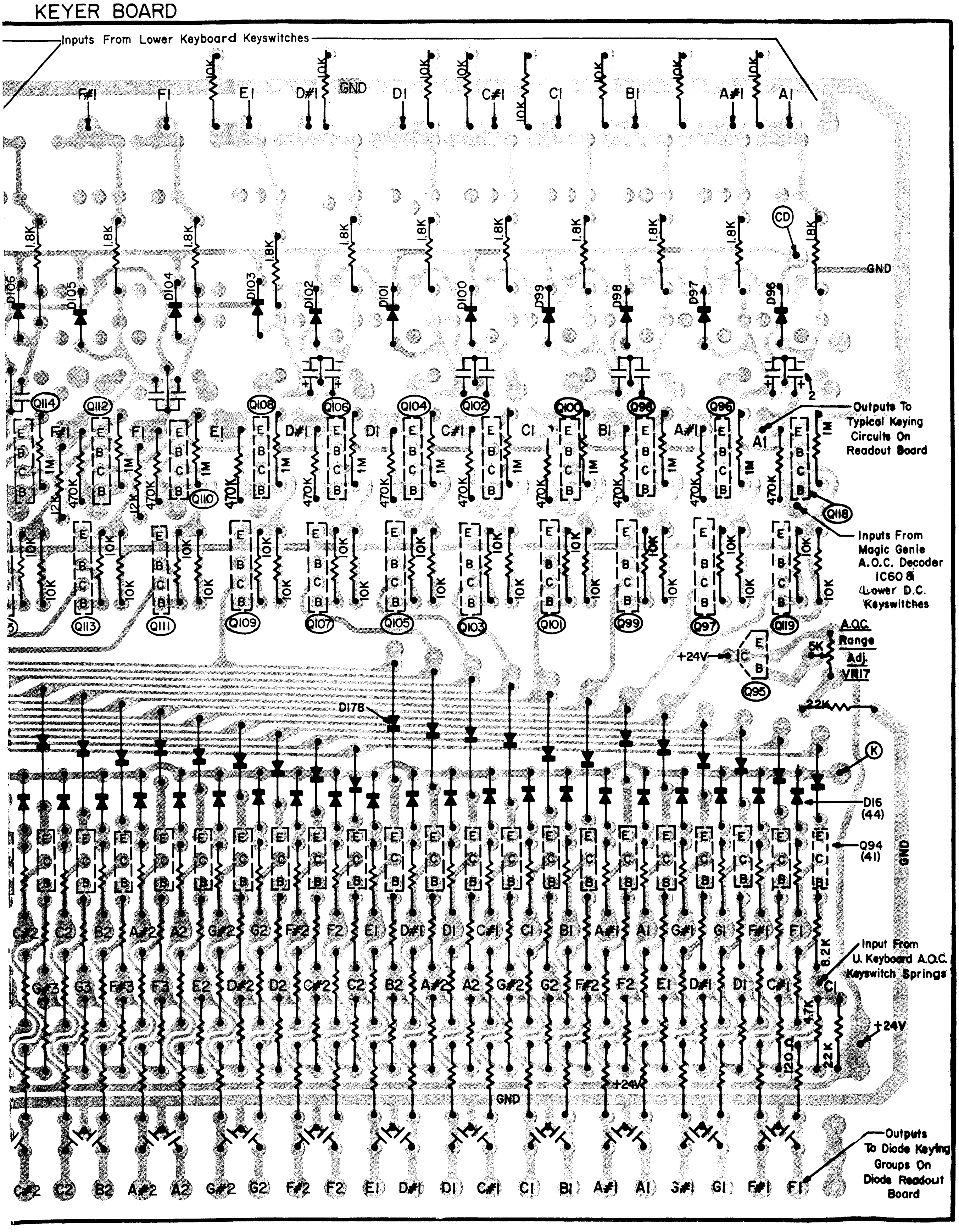
CONTROL BOARD



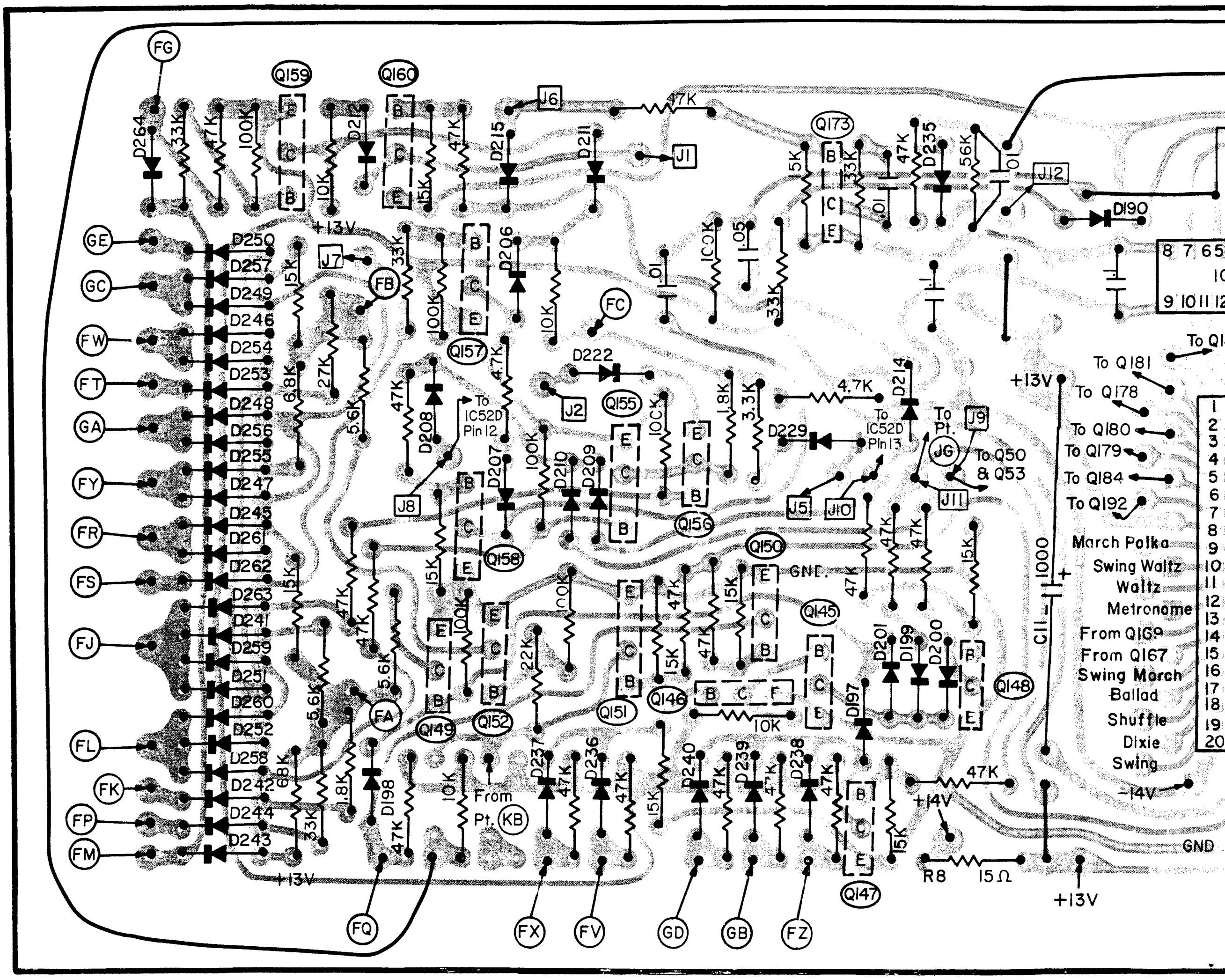
GND.
+15.5V
C26 +
100
GND
Q125
Q124
Q123
EX
R26 2.2K
47K
+16V
470Ω
E B C B
Q127
68K
1K
EG
R30
180K
2.2K
47K
EW
IC39
2
6.8K
EY
3.9K
500P
22K
4.7K
22K
2.2K
.0047
68K
22K
10K
From Pt.
JU
.22
6.8K
GND.
From Q126
6.8K
.0047
+16V
+11V
C29
10
From Q47
100K
100K
.0082
.0068
330K
DU
DT
10K
10K
.082
From Pt.
JZ
5K
R39
2.7K
E B C B
Q60
22K
150P
BQ
100Ω
IC31
8 7 6 5
1 2 3 4
3.3K
5.6K
22K
-8V
5.6K
GND.
CR
GM
E B C B
GND.
BW
R37
820Ω
Q92
56K
+16V
470Ω
470Ω
From Q154
C33
10K
47K
1K
.39
BN
BS
GND
22
To IC40 Pin 3
470K
-14V
5%
68K
1K
BX
.082
VR11 Genie Thump Adj
50K
D146
5%
68K
39K
BP
D145
22M
5%
68K
82K
8.2K
+
4.7K
1M
2.2K
GND
68K
Q58
G S D
68K
B C B E
Q59
10K
D144
1M
10K
47K
From Q139
.0068
680K
10K
.033
10K
220K
56K
.0027
22M
2.2M
.05
+16V
BM
From IC30D
5.6
1K
1K
220Ω
100K
+16V
220Ω
.0012
10K
6.8K
Q71
IC36
.0012
5%
22
.01
220Ω
220Ω
22K
800P
330K
5%
15K
IC37
15K
15K
15K
470K
9 8 7 6 5 4 3 2 1
+16V
GND
CU
Q72
LG
CV
82K
470K
15K
From VR5
22K
47K
10K
68K
47K
.022
100K
800P
4.7K
47K
300P
33K
33K
33K
20K
22K
+16V
4.7K
Q138
1
BK
m U. Keyb. ng Volume trol VR14
LE
DA
CW
LF
From L. Keyb. String Volume Control VR 9


(30) 10K
D#4 C#4 B4 A4 G3 F3 D#3 C#3 B3 A3 G2 F2 D#2 C#2 B2
E4 D4 C4 A#4 G#3 F#3 E3 D3 C3 A#3 G#2 F#2 E2 D2 C2
10K
(30) 1.8K
Outputs
To Typical Keying Circuits On Readout Board
D#4 C#4 B4 A4 G3 F3 D#3 C#3 B3 A3 G2 F2 D#2 C#2 B2
E4 D4 C4 A#4 G#3 F#3 E3 D3 C3 A#3 G#2 F#2 E2 D2 C2
A#2 A2 G#1
CC
1.8K 1.8K 1.8K
D108 D107
2
2
2
470K 470K 470K 470K 470K 470K 470K 470K 470K 470K 470K 470K 470K 470K 470K 470K 470K
12K 12K 12K 470K 470K
A#2 A2 G#1
Q116
E B C B
1M
GND
To Q114 To Q110 To Q106 To Q102 To Q98
To Q112 To Q108 To Q104 To Q100
To Q96 To Q118
10K 10K
Q117
GND
D178
D178
E C B
(44) 820 Ω
Inputs From U. Keyb. D.C. Keyswitch Springs
C4 B4 A#4 A4 G#4 G4 F#4 F4 E3 D#3 D3 C#3 C3 B3 A#3 A3 G#3 G3 F#3 F3 E2 D#2
(41) 8.2K
(40) 47K
22K
(40) 4.7K
C4 B4 A#4 A4 G#4 G4 F#4 F4 E3 D#3 D3 C#3 C3 B3 A#3
GND
(44) 120 Ω
30 30
+(44)+
C4 B4 A#4 A4 G#4 G4 F#4 F4 E3 D#3 D3 C#3 C3 B3 A#3 A3 G#3 G3 F#3 F3 E2 D#2

KEYER BOARD

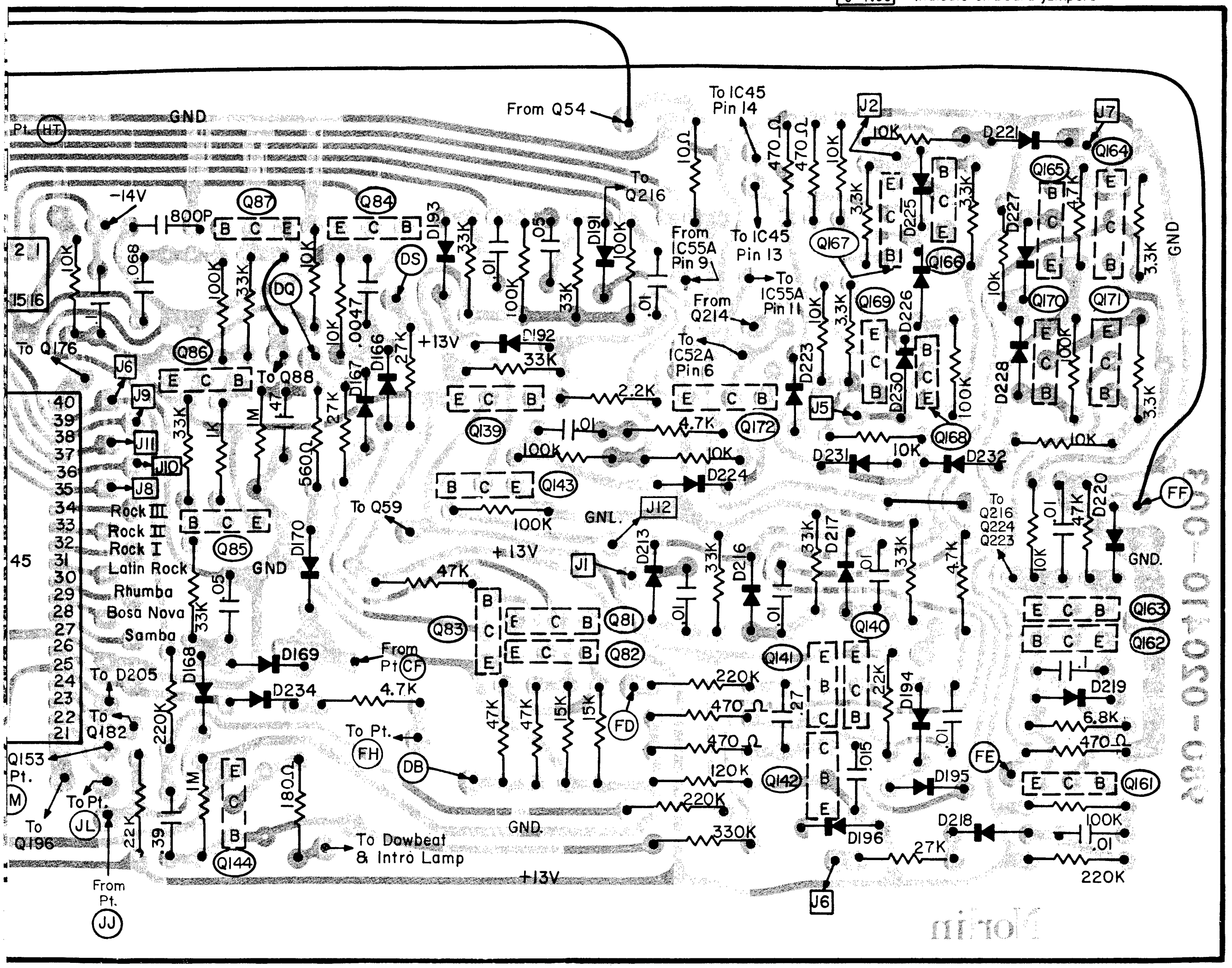

Inputs From Lower Keyboard Keyswitches
F#1
F1
E1
D#1
GND
D1
C#1
C1
B1
A#1
A1
10K
1.8K
CD
GND
D106
D105
D104
D103
D102
D101
D100
D99
D98
D97
D96
Q114
Q112
Q108
Q106
Q104
Q102
Q100
Q98
Q96
E
B
C
1M
470K
12K
Q110
Outputs To Typical Keying Circuits On Readout Board
A1
Q118
Inputs From Magic Genie A.O.C. Decoder IC60 & Lower D.C. Keyswitches
Q113
Q111
Q109
Q107
Q105
Q103
Q101
Q99
Q97
Q119
A.O.C. Range Adj. VR17
5K
+24V
Q95
22K
D178
K
D16 (44)
Q94 (41)
GND
C#2
C2
B2
A#2
A2
G#2
G2
F#2
F2
E1
D#1
D1
C#1
C1
B1
A#1
A1
G#1
G1
F#1
F1
G#3
G3
F#3
F3
E2
D#2
D2
C#2
C2
B2
A#2
A2
G#2
G2
F#2
F2
E1
D#1
D1
C#1
C1
8.2K
4.7K
120 Ω
22K
Input From U. Keyboard A.O.C. Keyswitch Springs
+24V
+24V
GND
Outputs To Diode Keying Groups On Diode Readout Board
C#2
C2
B2
A#2
A2
G#2
G2
F#2
F2
E1
D#1
D1
C#1
C1
B1
A#1
A1
G#1
G1
F#1
F1

RHYTHM CLOC


FG
D264
33K
47K
100K
Q159
Q160
D212
10K
15K
47K
D215
D211
J6
47K
J1
Q173
15K
33K
.01
47K
D235
56K
.01
J12
D190
+13V
GE
GC
FW
FT
GA
FY
FR
FS
FJ
FL
FK
FP
FM
D250
D257
D249
D246
D254
D253
D248
D256
D255
D247
D245
D261
D262
D263
D241
D259
D251
D260
D252
D258
D242
D244
D243
J7
FB
33K
100K
D206
10K
Q157
FC
D222
J2
Q155
47K
D208
To IC52D Pin 12
J8
D207
100K
D210
D209
Q158
100K
1.8K
3.3K
4.7K
D214
D229
To IC52D Pin 13
To Pt. JG
J9
To Q50 & Q53
J5
J10
J11
Q156
Q150
GND.
Q145
Q148
D201
D199
D200
D197
47K
15K
C11
1000
+13V
8 7 6 5
9 10 11 12
To Q181
To Q178
To Q180
To Q179
To Q184
To Q192
March Polka
Swing Waltz
Waltz
Metronome
From Q169
From Q167
Swing March
Ballad
Shuffle
Dixie
Swing
-14V
GND
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
15K
6.8K
27K
5.6K
47K
5.6K
68K
33K
1.8K
D198
FA
Q149
Q152
22K
Q151
Q146
10K
Q147
47K
10K
From Pt. KB
D237
D236
D240
D239
D238
47K
15K
+14V
R8
15Ω
+13V
FQ
FX
FV
GD
GB
FZ
.05
.01
.1

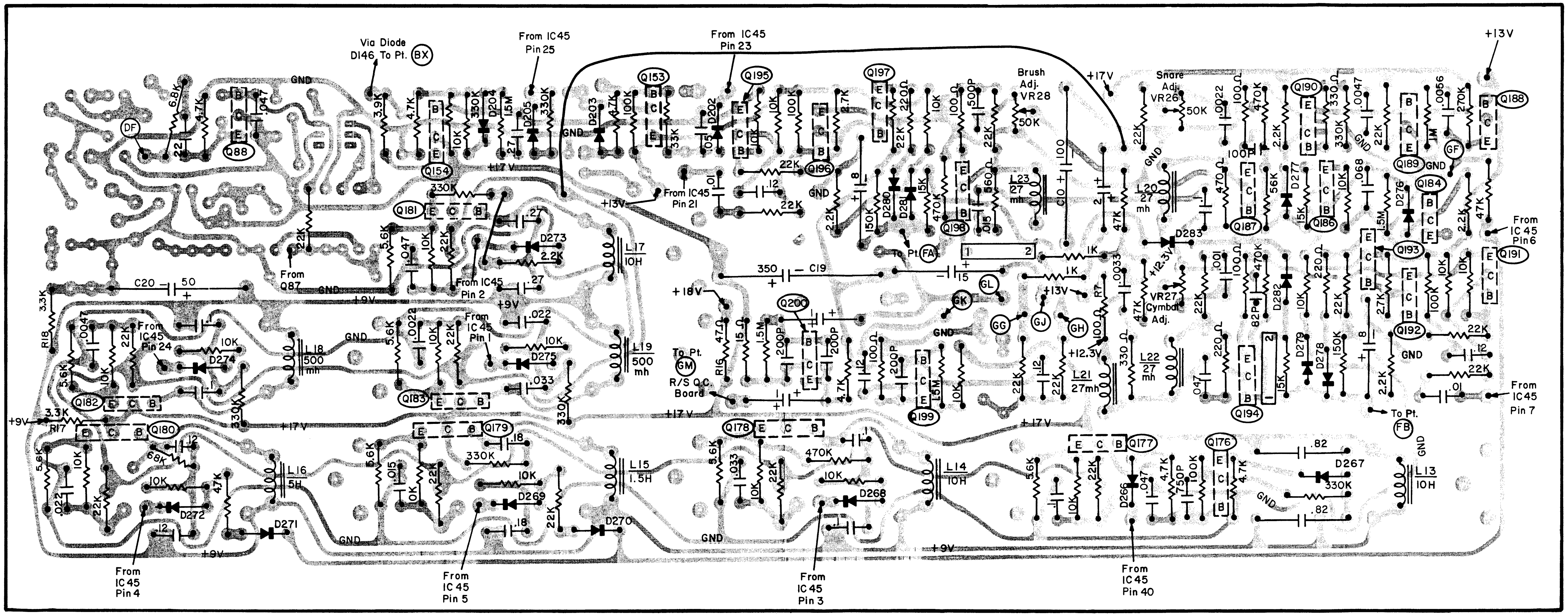
BOARD

"J" Nos Indicate on board jumpers

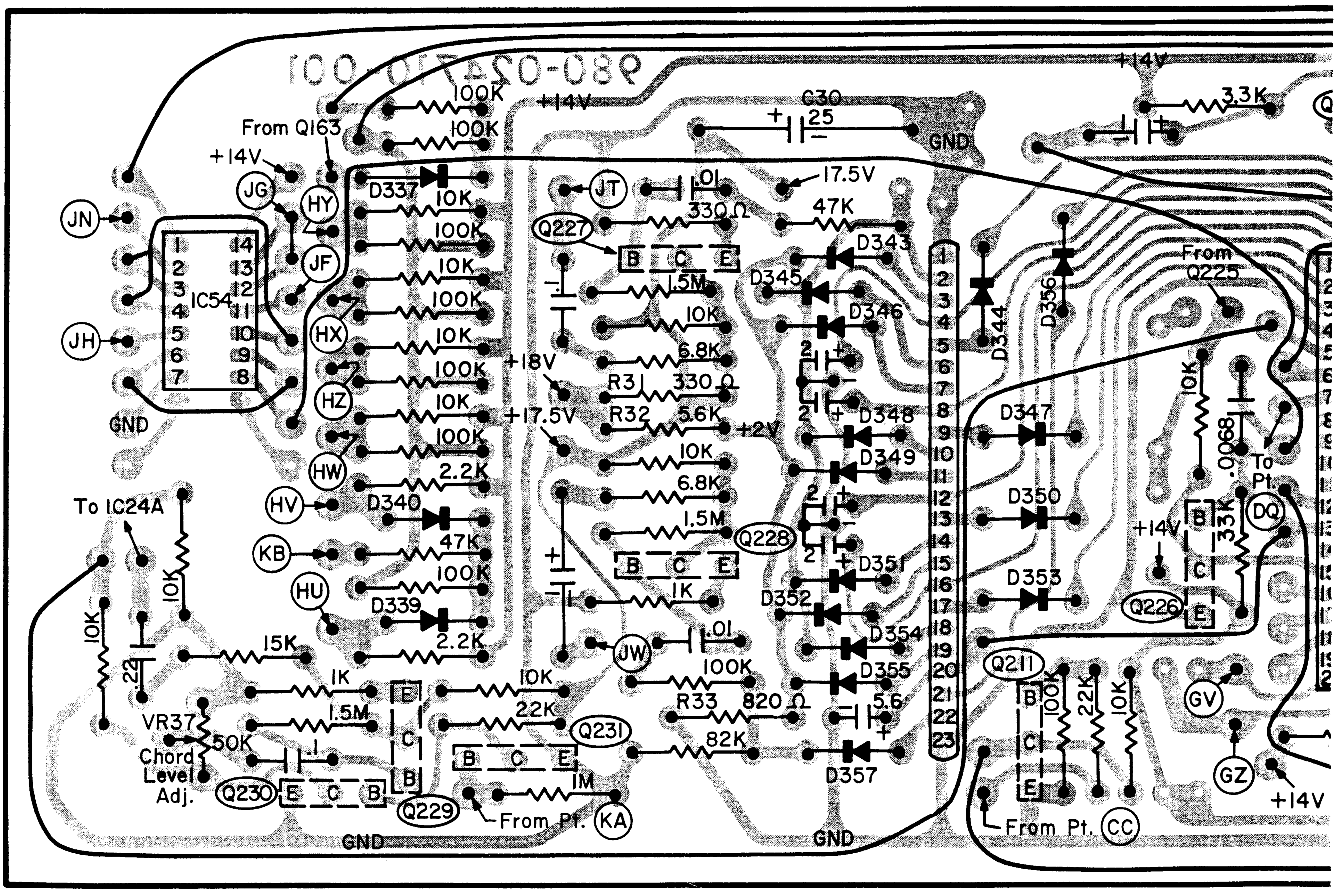


From Q54
To Q216
To IC45 Pin 14
GND
Pt. HT
-14V
800P
Q87
Q84
D193
33K
.01
.05
D191
100K
From IC55A Pin 9
To IC45 Pin 13
To IC55A Pin 11
From Q214
To IC52A Pin 6
DS
DQ
To Q176
Q86
To Q88
J6
J9
J11
J10
J8
+13V
D192
D166
D167
27K
2.2K
4.7K
Q139
Q172
Q143
D224
To Q59
100K
GNL.
J12
J1
Q85
D170
560
Rock III
Rock II
Rock I
Latin Rock
Rhumba
Bosa Nova
Samba
45
To D205
To Q182
Q153 Pt.
M
To Q196
To Pt. JL
From Pt. JJ
D168
D169
D234
From Pt CF
To Pt. FH
DB
FD
Q83
Q81
Q82
47K
15K
220K
470Ω
120K
330K
Q144
180Ω
To Dowbeat & Intro Lamp
Q141
Q142
Q140
D213
D216
D217
D194
D195
D196
J6
D218
Q167
Q169
Q166
Q168
D225
D226
D223
D230
J5
D231
D232
10K
J2
J7
D221
Q164
Q165
Q170
Q171
D227
D228
3.3K
GND
FF
D220
To Q216 Q224 Q223
Q163
Q162
D219
6.8K
FE
Q161
100K
220K
.01

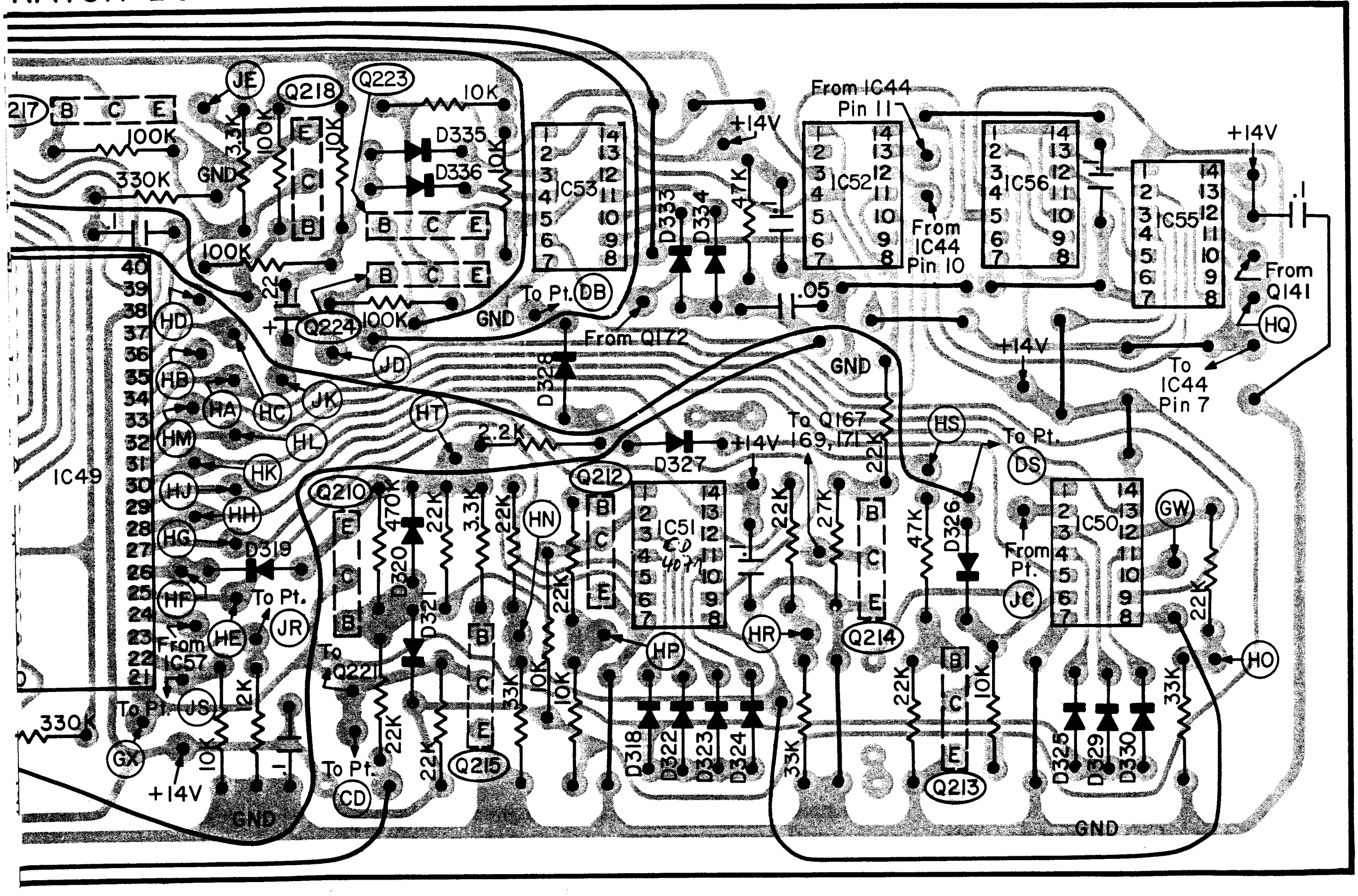
INSTRUMENTATION BOARD


Via Diode D146 To Pt. BX
From IC45 Pin 25
From IC45 Pin 23
+13V
GND
DF
Q88
Q153
Q154
Q195
Q196
Q197
Q198
Brush Adj. VR28
50K
+17V
Snare Adj. VR26
50K
Q190
Q188
Q189
GF
Q184
From IC45 Pin6
Q181
From IC45 Pin 21
From Q87
From IC45 Pin 2
C20
50
350
C19
+18V
To Pt. FA
Q187
Q186
D283
Q193
Q191
L17 10H
L20 27 mh
L23 27 mh
R18
3.3K
From IC45 Pin 24
From IC45 Pin 1
D273
D274
D275
L18 500 mh
L19 500 mh
To Pt. GM
R/S O.C. Board
Q200
GK
GL
GG
GJ
GH
+12.3V
VR27 Cymbal Adj.
R7
D282
D279
D278
Q192
From IC45 Pin 7
To Pt. FB
Q182
Q183
Q199
L21 27mh
L22 27 mh
Q194
+9V
3.3K
R17
Q180
Q179
Q178
Q177
Q176
L16 5H
L15 1.5H
L14 10H
L13 10H
D272
D271
D269
D270
D268
D266
D267
From IC45 Pin 4
From IC45 Pin 5
From IC45 Pin 3
From IC45 Pin 40

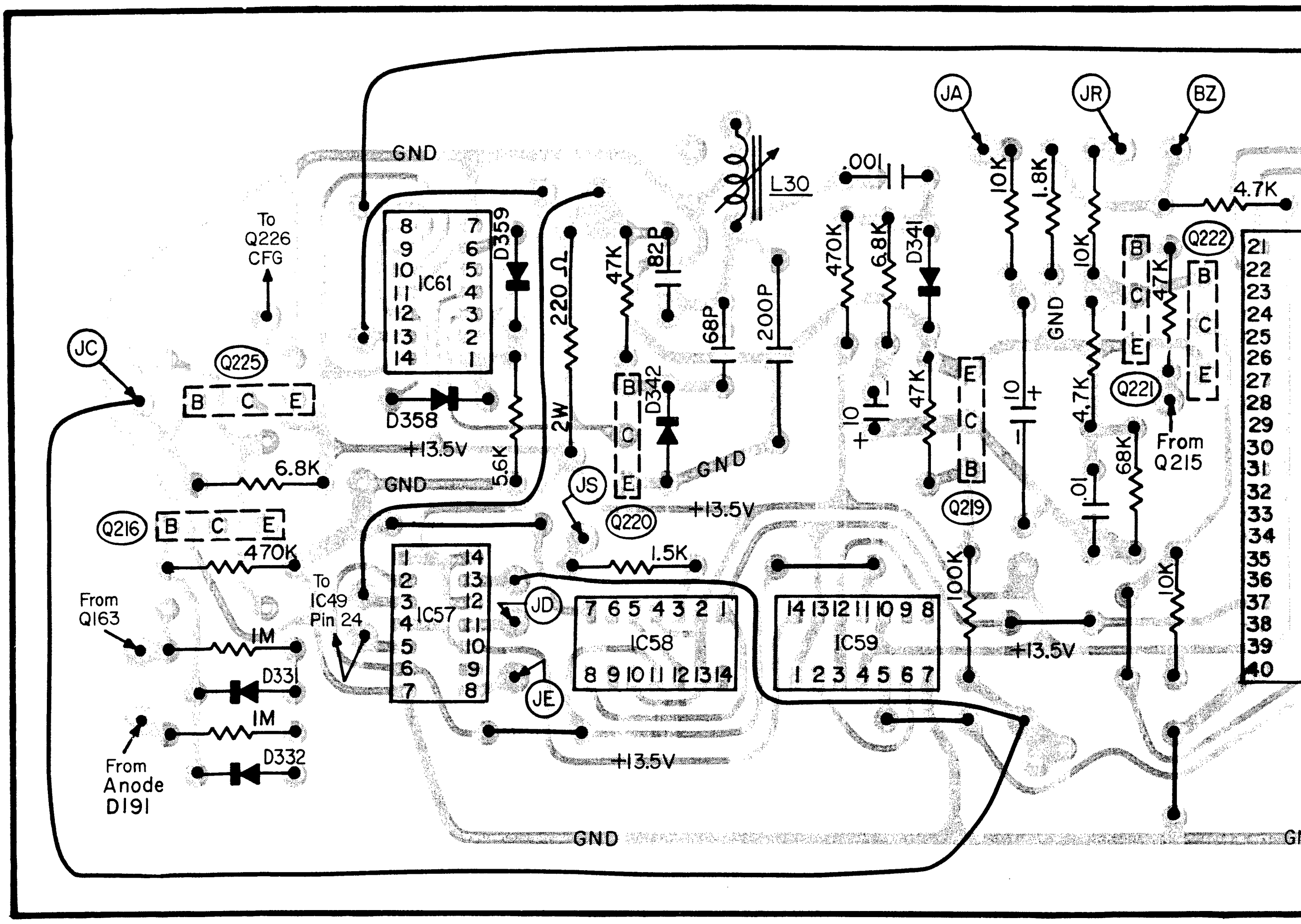
CHORD FUNCTION GENE


980-024710-001
From Q163
+14V
JG
HY
JF
JN
JH
IC54
GND
HX
HZ
HW
HV
KB
HU
To IC24A
D337
D340
D339
10K
100K
47K
2.2K
15K
1K
1.5M
22
VR37
50K
Chord
Level
Adj.
Q230
Q229
Q231
From Pt. KA
1M
22K
JT
.01
330 Ω
Q227
+18V
+17.5V
R3
R32
5.6K
6.8K
+2V
Q228
JW
R33
820 Ω
82K
5.6
C30
25
17.5V
D343
D345
D346
D348
D349
D351
D352
D354
D355
D357
D344
D356
D347
D350
D353
From Q225
3.3K
.0068
33K
To Pt.
DQ
Q226
Q211
GV
GZ
From Pt. CC
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
B
C
E

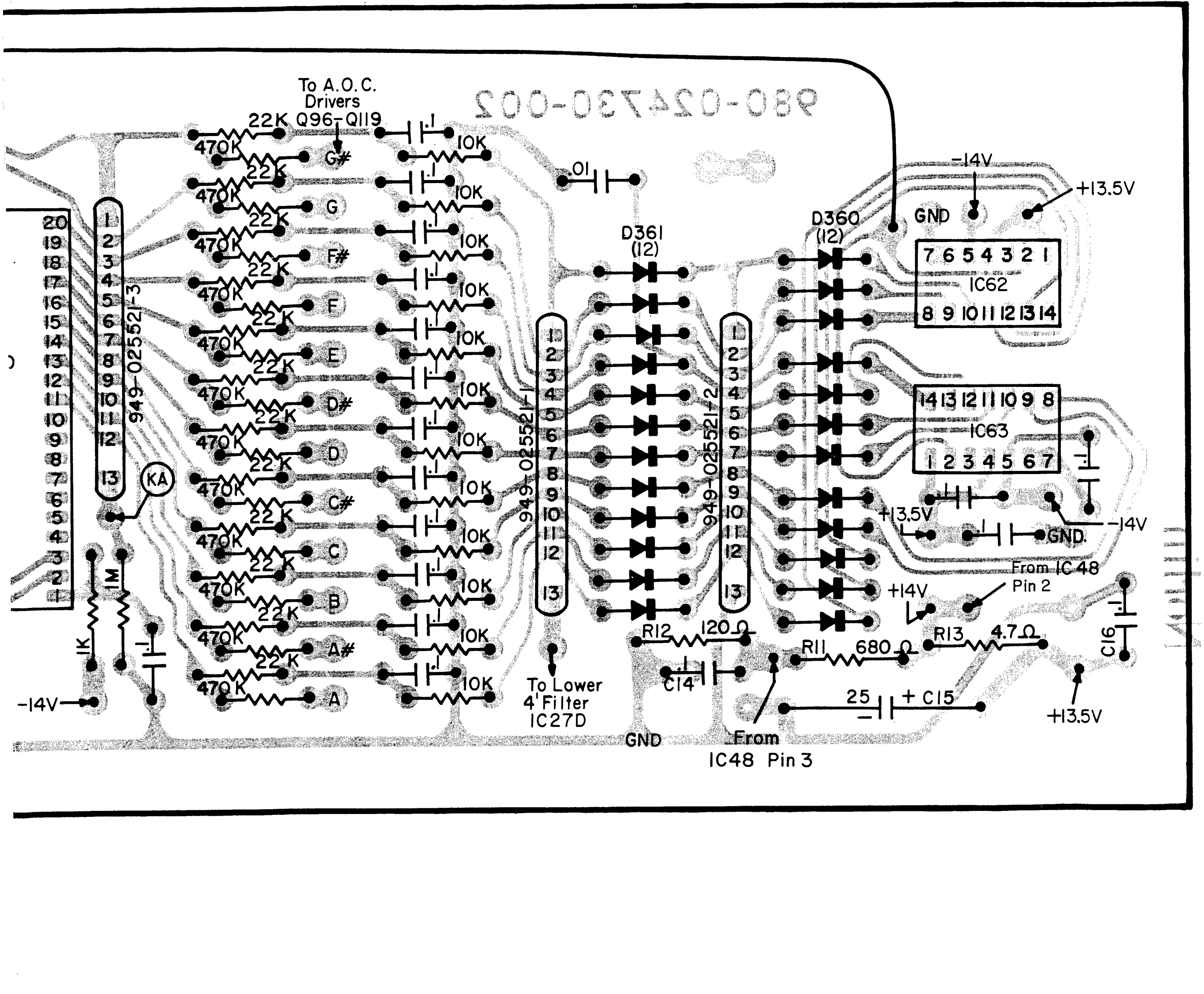
RATOR BOARD


217
B C E
Q218
Q223
JE
100K
3.3K
10K
330K
GND
D335
D336
IC53
100K
22
Q224
JD
JK
To Pt. DB
GND
From Q172
D328
D333
D334
+14V
47K
.05
From IC44 Pin 11
IC52
IC56
IC55
From IC44 Pin 10
+14V
.1
From Q141
HQ
To IC44 Pin 7
GND
To Q167 169, 171
HS
To Pt. DS
IC49
HD
HB
HA
HC
HM
HL
HK
HJ
HH
HG
D319
HF
HE
To Pt.
JR
From IC57
To Pt.
JS
GX
+14V
2K
10K
GND
HT
2.2K
D327
Q210
470K
22K
3.3K
22K
HN
D320
D321
To Q221
Q215
33K
10K
To Pt.
CD
Q212
IC51
C.D 4071
HP
D318
D322
D323
D324
HR
22K
27K
Q214
33K
47K
D326
From Pt.
JC
IC50
GW
Q213
D325
D329
D330
HO
GND

MAGIC GENIE, 4' T.O.

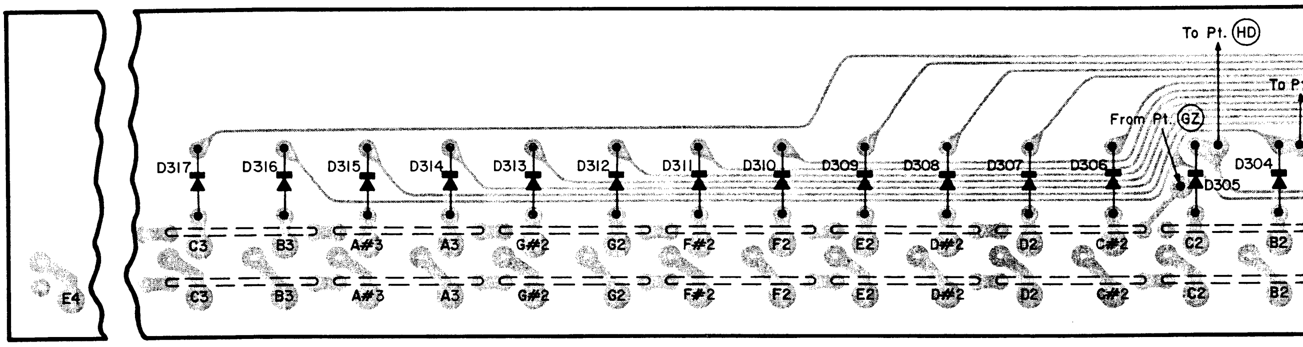

GND
To Q226 CFG
IC61
D359
220 Ω
2W
47K
82P
L30
.001
470K
6.8K
D341
JA
JR
BZ
10K
1.8K
GND
10K
4.7K
Q222
Q221
B C E
From Q215
JC
Q225
D358
+13.5V
5.6K
D342
68P
200P
Q220
JS
GND
+13.5V
10
47K
Q219
.01
68K
6.8K
Q216
470K
From Q163
IM
D331
IM
D332
From Anode D191
To IC49 Pin 24
IC57
JD
JE
1.5K
IC58
IC59
100K
10K
+13.5V
GND
21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

, A.O.C. & OSC. BOARD

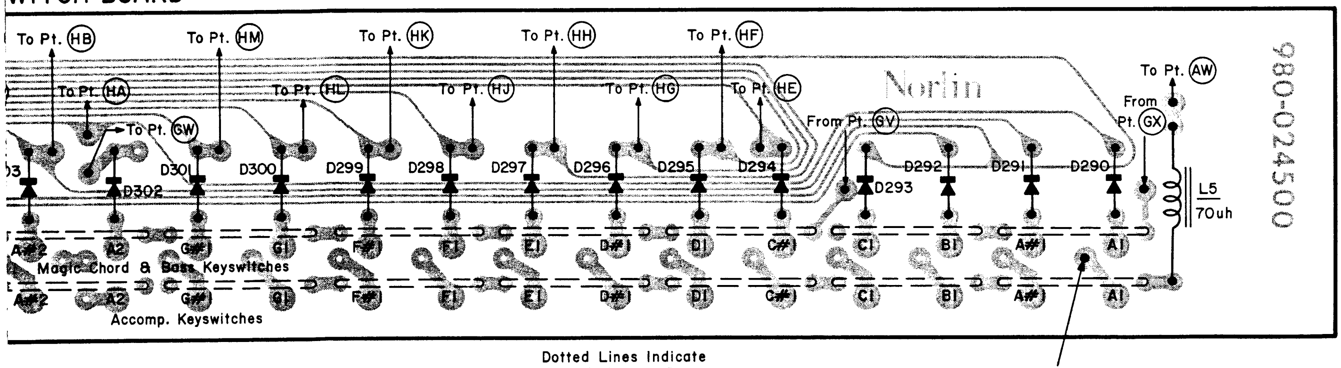


To A.O.C. Drivers Q96-Q119
980-024730-002
22K
470K
10K
.1
.01
G#
G
F#
F
E
D#
D
C#
C
B
A#
A
949-025521-3
949-025521-1
949-025521-2
KA
1K
1M
-14V
D361 (12)
D360 (12)
GND
+13.5V
7 6 5 4 3 2 1
IC62
8 9 10 11 12 13 14
14 13 12 11 10 9 8
IC63
1 2 3 4 5 6 7
GND.
+14V
From IC 48 Pin 2
R12
120 Ω
C14
R11
680 Ω
R13
4.7 Ω
C16
25
+ C15
To Lower 4' Filter IC27D
From IC48 Pin 3

LOWER KE

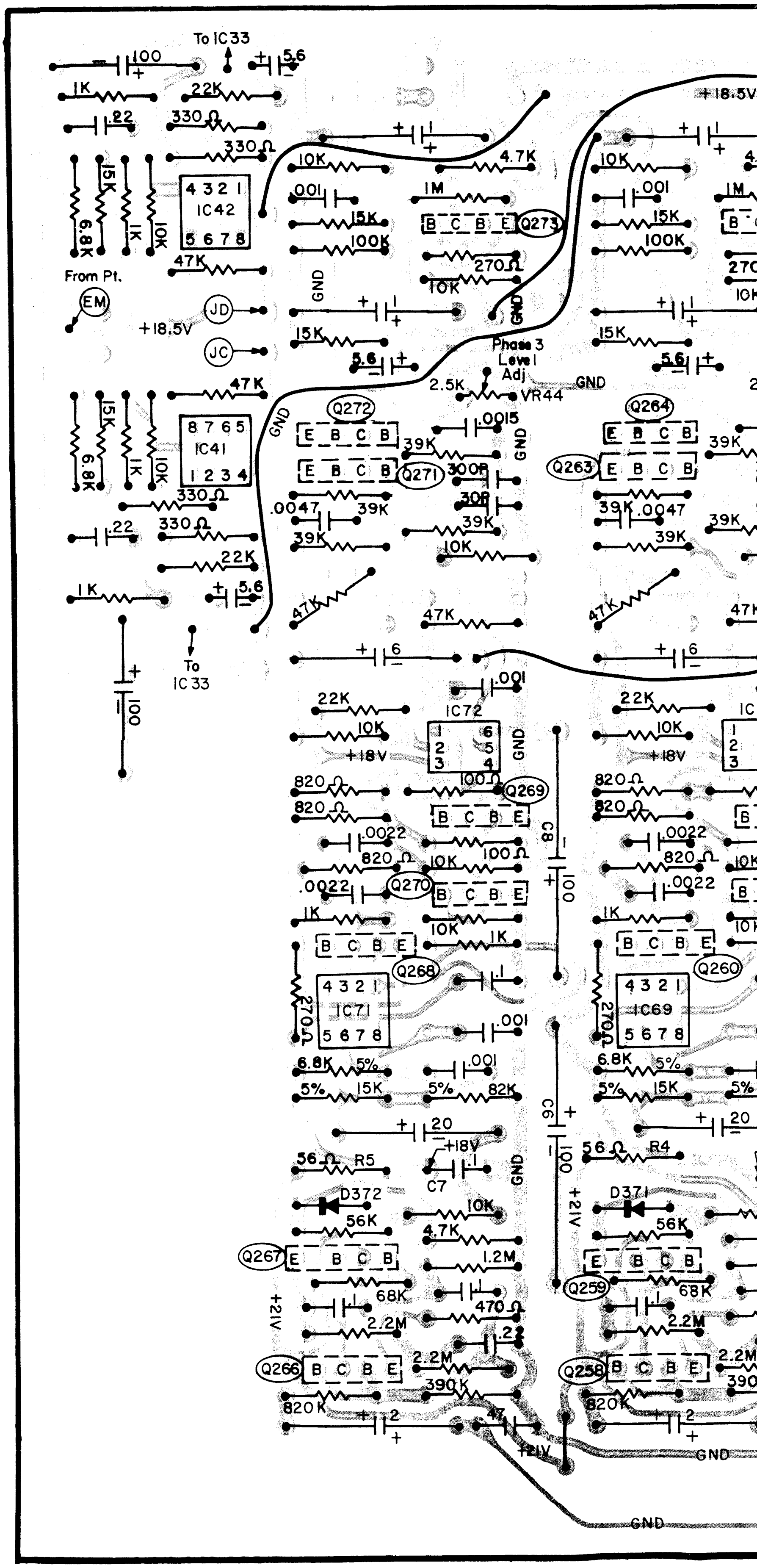

To Pt. HD
To P
From Pt. GZ
D317
D316
D315
D314
D313
D312
D311
D310
D309
D308
D307
D306
D305
D304
C3
B3
A#3
A3
G#2
G2
F#2
F2
E2
D#2
D2
C#2
C2
B2
C3
B3
A#3
A3
G#2
G2
F#2
F2
E2
D#2
D2
C#2
C2
B2
E4

WITCH BOARD

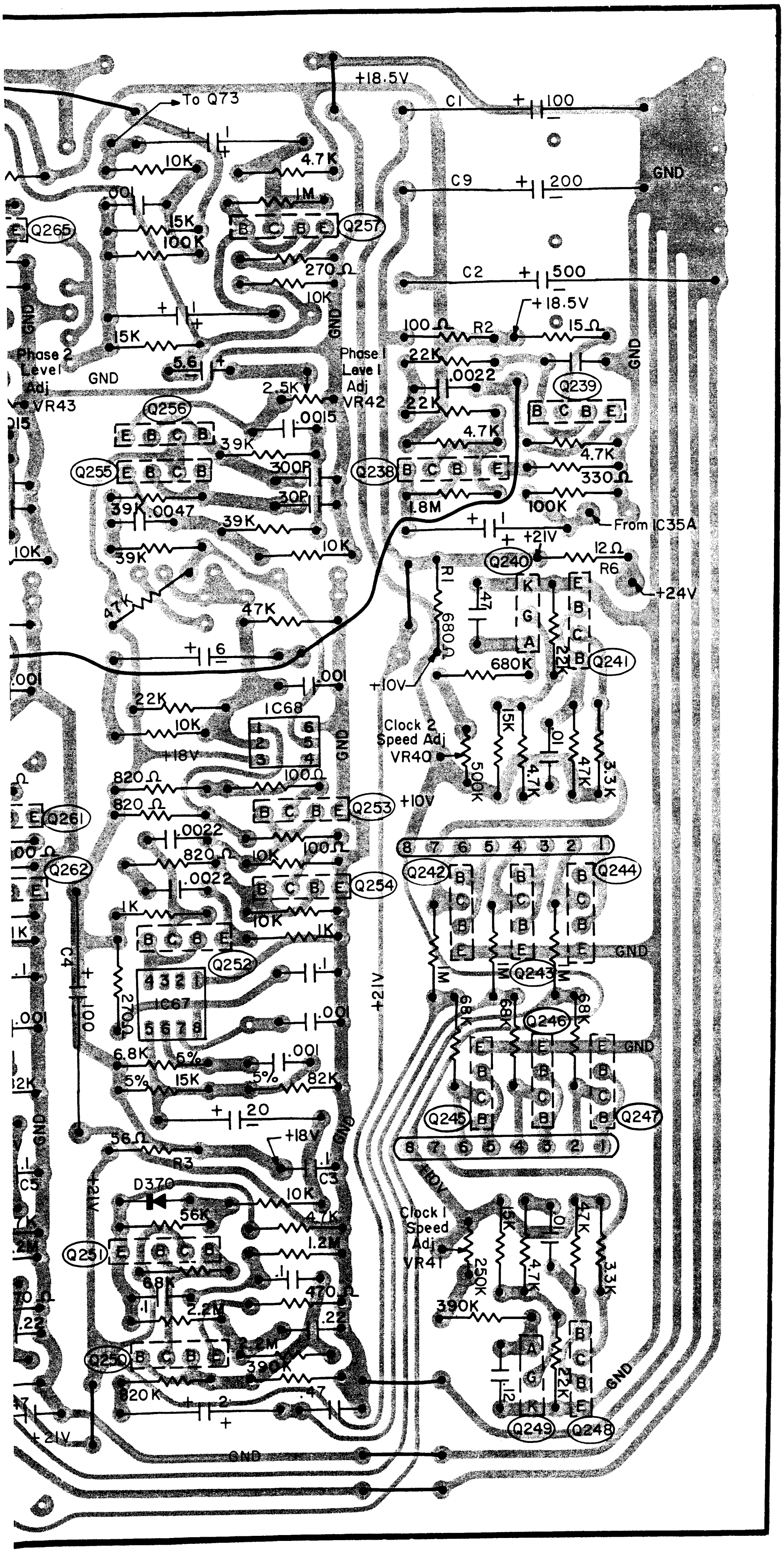

To Pt. HB
To Pt. HM
To Pt. HK
To Pt. HH
To Pt. HF
To Pt. HA
To Pt. GW
To Pt. HL
To Pt. HJ
To Pt. HG
To Pt. HE
From Pt. GV
To Pt. AW
From Pt. GX
Norlin
980-024500
D302
D301
D300
D299
D298
D297
D296
D295
D294
D293
D292
D291
D290
L5
70uh
A#2
A2
G#1
G1
F#1
F1
E1
D#1
D1
C#1
C1
B1
A#1
A1
Magic Chord & Bass Keyswitches
Accomp. Keyswitches

Dotted Lines Indicate
Keyswitch Buss Bars

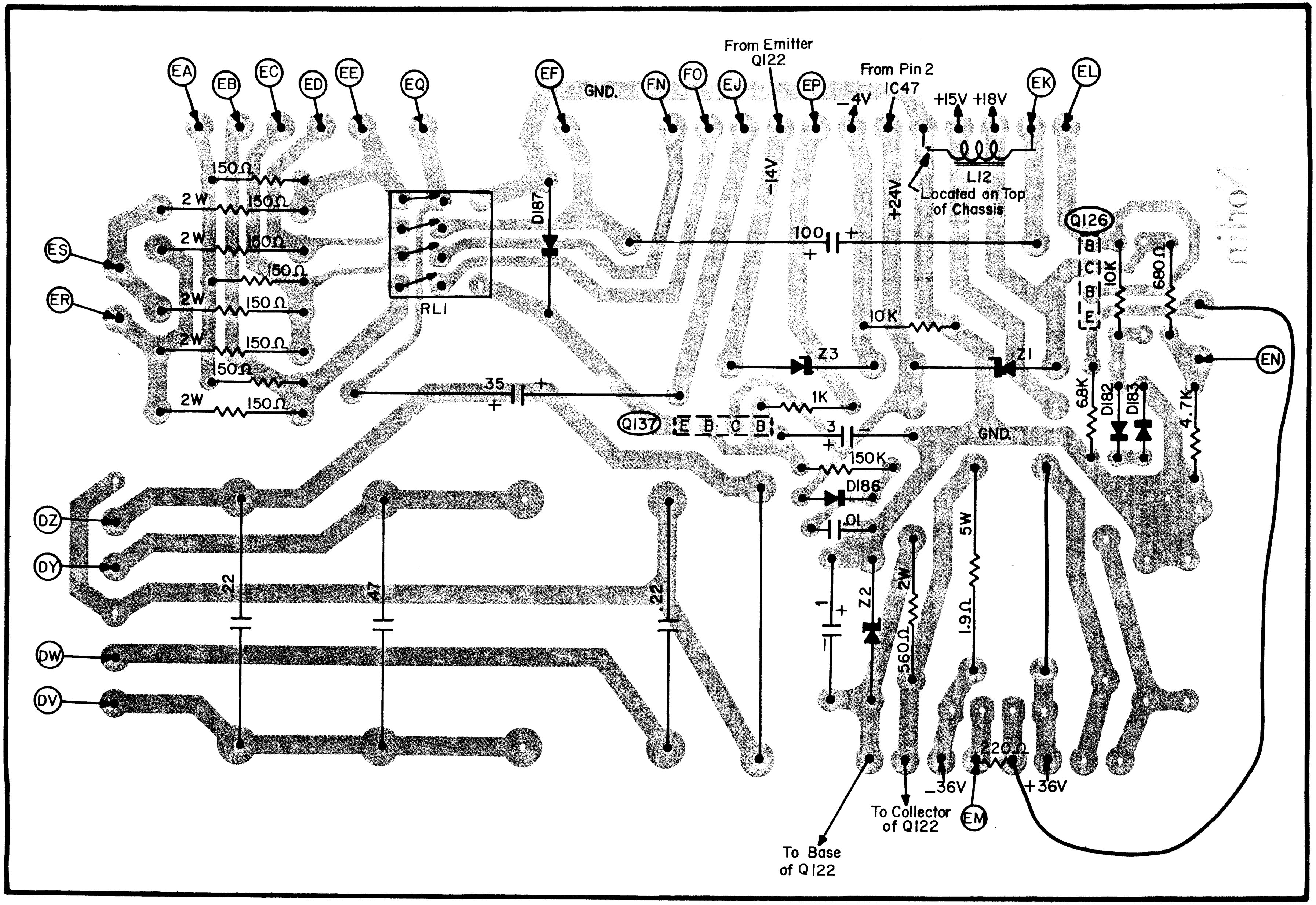
Outputs to Lower
D.C. Keying Circuits
on A.O.C. & Keyer Board


To IC33
100
5.6
1K
22K
.22
330Ω
330Ω
+18.5V
4.7K
10K
.001
1M
15K
100K
Q273
270Ω
IC42
4 3 2 1
5 6 7 8
15K
6.8K
1K
10K
47K
From Pt.
EM
JD
JC
+18.5V
GND
Phase 3 Level Adj
2.5K
VR44
Q272
Q271
Q264
Q263
IC41
8 7 6 5
1 2 3 4
.0015
39K
300P
30P
.0047
22K
To IC33
47K
6
.001
IC72
1 6
2 5
3 4
+18V
820Ω
100Ω
Q269
.0022
Q270
C8
100
1K
Q268
IC71
270Ω
6.8K 5%
15K
82K
C9
20
56Ω R5
C7
D372
56K
4.7K
1.2M
Q267
68K
470Ω
+21V
2.2M
Q266
390K
820K
2
.47
+21V
GND
IC69
Q260
Q259
Q258
D371
56Ω R4
B C B E
E B C B

MODULATOR

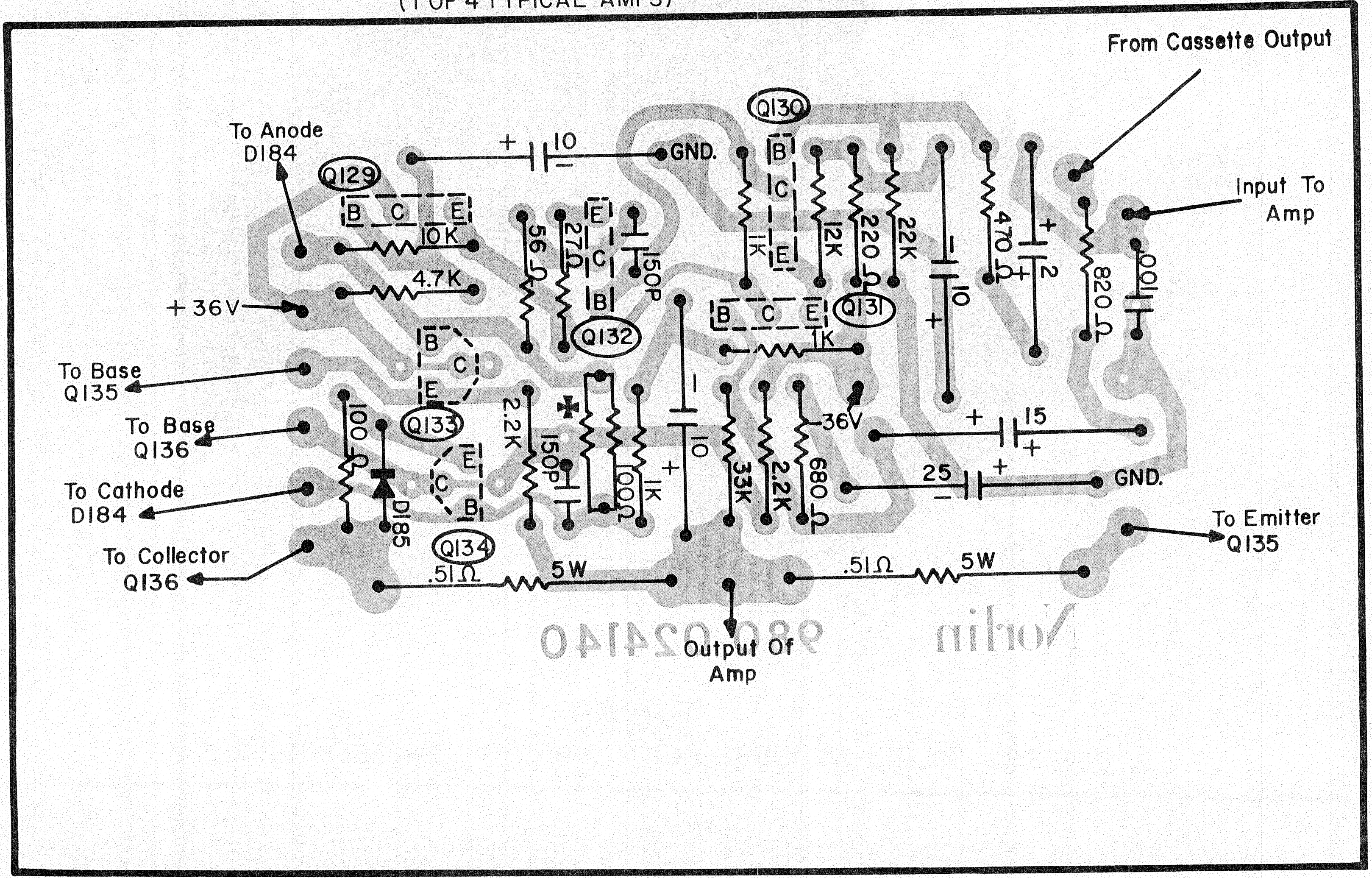

To Q73
+18.5V
C1
100
C9
200
C2
500
GND
R2
+18.5V
15Ω
100Ω
22K
.0022
Q239
4.7K
330Ω
100K
From IC35A
1.8M
+21V
Q240
12Ω
R6
+24V
R1
680Ω
680K
22K
Q241
+10V
Clock 2 Speed Adj VR40
500K
15K
4.7K
.01
47K
3.3K
Q238
Phase 1 Level Adj VR42
Phase 2 Level Adj VR43
Q257
4.7K
1M
270Ω
10K
15K
100K
Q265
5.6
2.5K
.0015
Q256
39K
300P
30P
Q255
.0047
10K
47K
6
.001
22K
10K
IC68
+18V
820Ω
100Ω
Q253
+10V
.0022
100Ω
Q261
Q262
Q254
1K
Q252
IC67
2700
C4
100
.1
.001
6.8K
5%
15K
82K
20
+21V
56Ω
R3
+18V
C3
D370
56K
4.7K
1.2M
Q251
68K
2.2M
470
.22
Q250
390K
820K
2
.47
Q242
Q243
Q244
1M
68K
Q246
Q245
Q247
Clock 1 Speed Adj VR41
250K
390K
.12
Q249
Q248
GND

POWER SUPPLY BOARD


EA
EB
EC
ED
EE
EQ
EF
GND.
FN
FO
EJ
From Emitter Q122
EP
-4V
From Pin 2 IC47
+15V +18V
EK
EL
-14V
+24V
L12
Located on Top of Chassis
Q126
B C B E
10K
680Ω
EN
ES
ER
150Ω
2W
RL1
D187
100
35
10K
Z3
Z1
1K
Q137
E B C B
3
150K
D186
.01
GND.
68K
D182
D183
4.7K
DZ
DY
DW
DV
.22
.47
1
Z2
2W
560Ω
5W
1.9Ω
220Ω
-36V
+36V
EM
To Collector of Q122
To Base of Q122

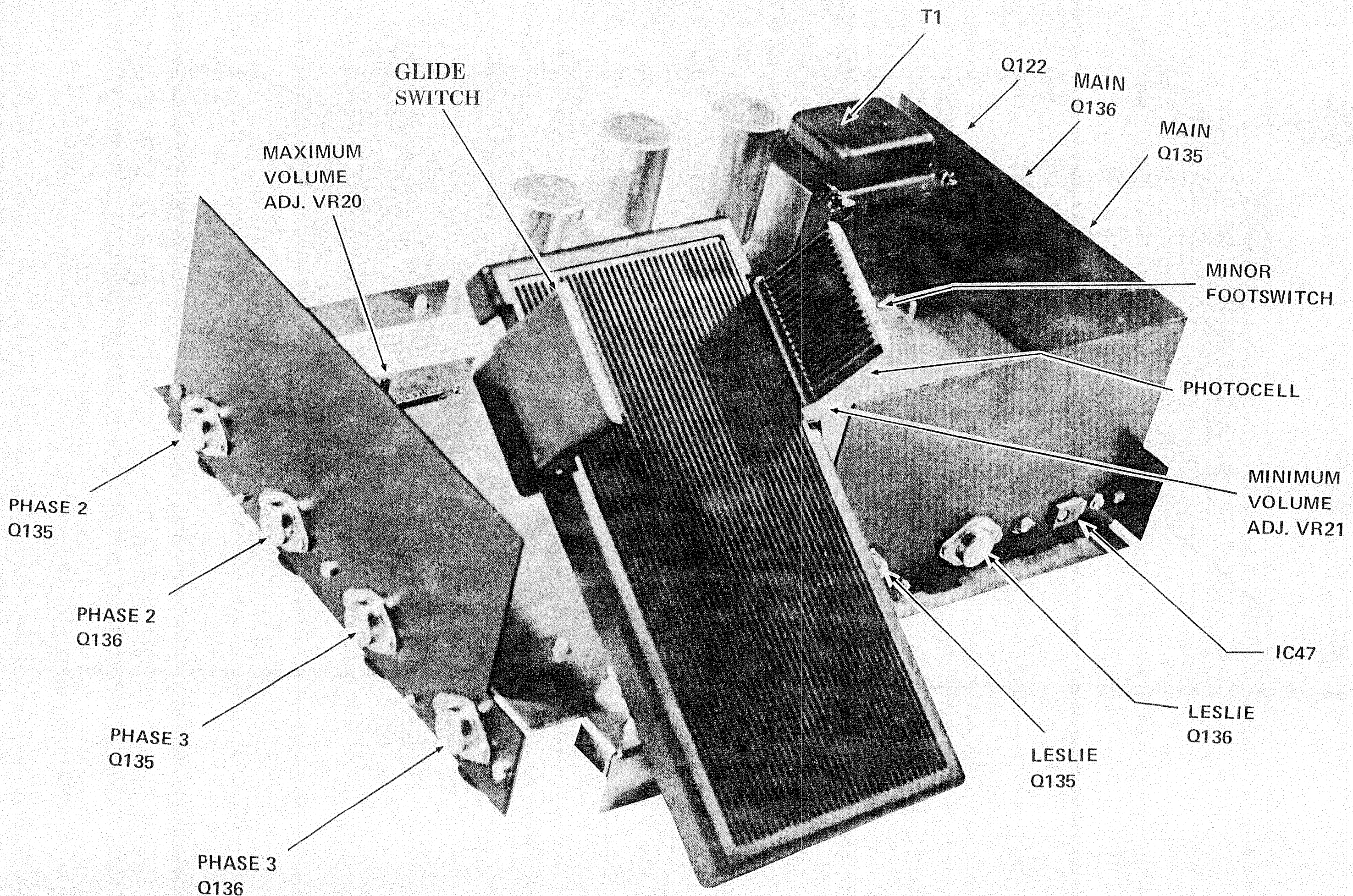
AMPLIFIER BOARD

(1 OF 4 TYPICAL AMPS)


From Cassette Output
Input To Amp
To Anode D184
+36V
To Base Q135
To Base Q136
To Cathode D184
To Collector Q136
To Emitter Q135
Output Of Amp
GND.
GND.
Q129
Q130
Q131
Q132
Q133
Q134
D185
B
C
E
10K
4.7K
56 Ω
27 Ω
150P
10
1K
12K
220 Ω
22K
470 Ω
2
820 Ω
.001
15
25
-36V
680 Ω
2.2K
33K
100 Ω
100 Ω
.51 Ω
5W

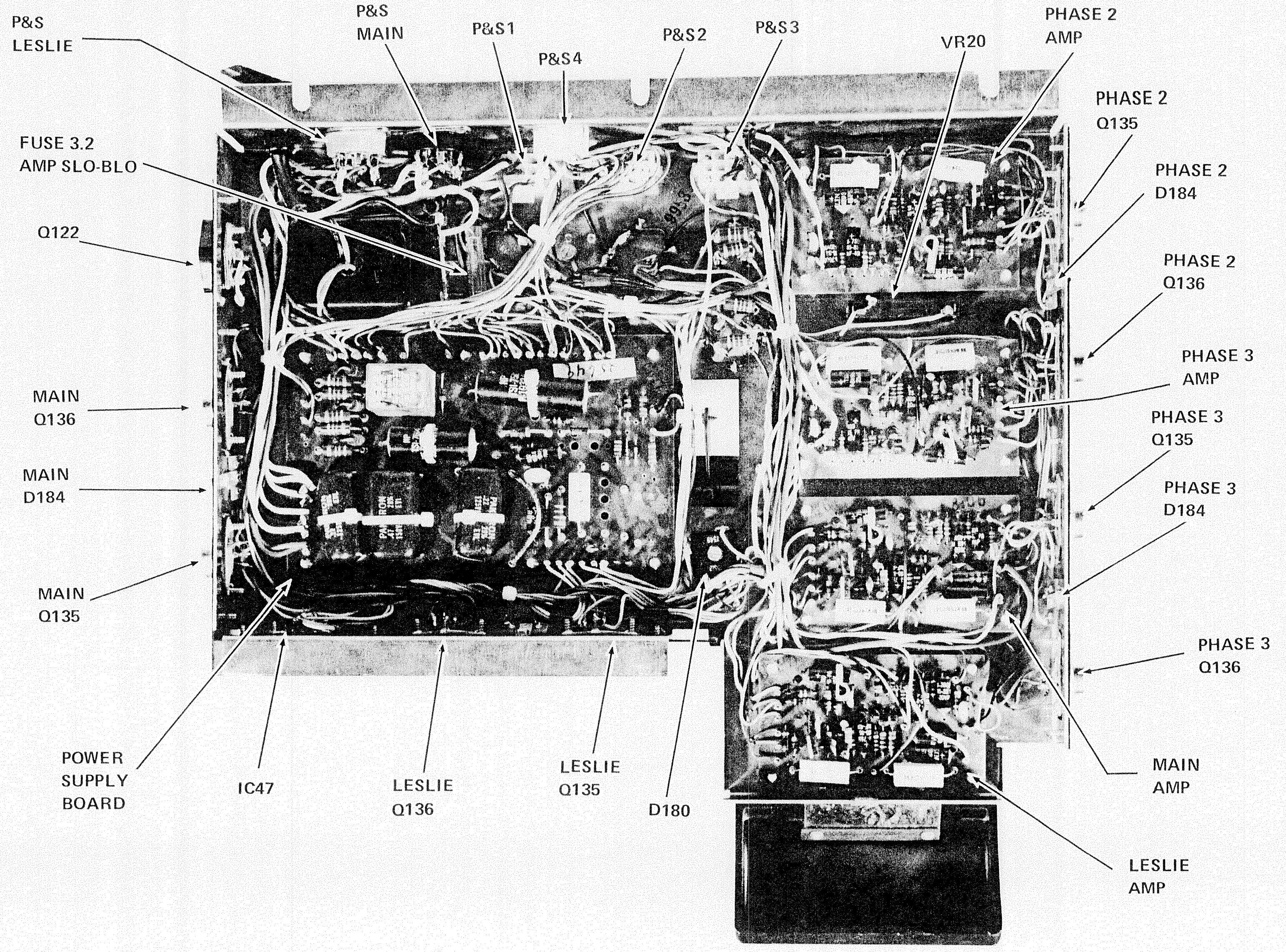
AMPLIFIER/POWER SUPPLY & EXPRESSION PEDAL ASSEMBLY

(Top View)


T1
Q122
MAIN
Q136
MAIN
Q135
GLIDE
SWITCH
MAXIMUM
VOLUME
ADJ. VR20
MINOR
FOOTSWITCH
PHOTOCELL
MINIMUM
VOLUME
ADJ. VR21
PHASE 2
Q135
PHASE 2
Q136
PHASE 3
Q135
PHASE 3
Q136
IC47
LESLIE
Q136
LESLIE
Q135

AMPLIFIER/POWER SUPPLY/EXPRESSION PEDAL ASSEMBLY

Bottom View


P&S LESLIE
P&S MAIN
P&S1
P&S4
P&S2
P&S3
VR20
PHASE 2 AMP
PHASE 2 Q135
PHASE 2 D184
PHASE 2 Q136
PHASE 3 AMP
PHASE 3 Q135
PHASE 3 D184
PHASE 3 Q136
FUSE 3.2 AMP SLO-BLO
Q122
MAIN Q136
MAIN D184
MAIN Q135
POWER SUPPLY BOARD
IC47
LESLIE Q136
LESLIE Q135
D180
MAIN AMP
LESLIE AMP

SPECIFICATIONS

LOWREY 4-CHANNEL SYMPHONIC HOLIDAY

Model TGS-1. . . completely solid-state (large-scale integrated circuit and transistor), self-contained 4-channel home spinet organ with two 44-note keyboards and a 13-note pedalboard.

Includes four 30-watt amplifiers and four separate speaker channels. Two 10" bass speakers - enclosed in a sealed acoustic tone chamber - and two 8" speakers, comprise the Main and Leslie channels. Two 6"x9" speakers comprise the other two speaker channels.

Dimensions: 39-3/4" high (without music rack), 46-3/8" wide and 25-1/4" deep.

Finishes: Mediterranean Distressed Pecan, Early American Distressed Cherry and Traditional Walnut.

UPPER KEYBOARD VOICES & EFFECTS

CUSTOM VOICING

Trombone 16
Trumpet 16
Oboe 8
Kinura 8
Flute 16
Flute 8
Flute 5-1/3
Flute 4
Flute 2-2/3
Flute 2
Flute Preset

EFFECTS

Symphonic Wow Attack. . . Slow
Sustain. . . On
Repeat Percuss. . . On
Percuss. . . Short/Long
Vibrato. . . On
AOC. . . On

SPECIFICATIONS

UPPER KEYBOARD VOICES & EFFECTS (Cont.)

CUSTOM CONTROLS

Reverb Length. . . Min/Max
Symphonic Wow Attack Range. . . Min/Max
Sustain Length. . . Min/Max
Repeat Percuss Speed. . . Min/Max
Vibrato Depth. . . Min/Max
Vibrato Speed. . . Min/Max

UPPER KEYBOARD PRESET VOICES

SUSTAIN

Vibes
Vibra Harp
Hawaiian Guitar
Piano
Electric Piano

PERCUSSION

Harpsichord
Mandolin
Banjo
Harmonic 4
Harmonic 2-2/3

NORMAL ATTACK

Orchestral Clarinet

SLOW ATTACK

Accordion
Piccolo
Violin

AUTO WOW

Symphonic Wow

LOWER KEYBOARD VOICES & CONTROLS

LOWER KEYBOARD VOICES

Flute
Flute 4
Piano
Guitar
Banjo
Ukulele

LOWER KEYBOARD CONTROLS

Genie Volume. . . Min/Max
Genie Voices. . . Normal/Plus Organ
Flute Volume. . . Min/Max

BASS VOICES & CONTROLS

KEYBOARD VOICES

String Bass
Guitar Bass

PEDAL VOICES

Pedal. . . String Bass/Guitar Bass
Pedal Wow
Pedal. . . 8/16-8

KEYBOARD & PEDAL BASS CONTROLS

Bass. . . Med
Bass. . . Full
Pedal Sustain

SYMPHONIC STRING VOICES & CONTROLS

UPPER KEYBOARD VOICES

Cello 16
Viola 8
Violina 4

LOWER KEYBOARD VOICES

Viola 8
Violina 4

SYMPHONIC STRING CONTROLS

Lower Keyboard Volume Control. . . Min/Max
Upper Keyboard Volume Control. . . Min/Max

GENIE SYMPHONIC RHYTHM VOICES & CONTROLS

RHYTHM VOICES

Samba
Bosa Nova
Rhumba
Latin Rock
Rock I
Rock II
Rock III
Swing
Dixie
Shuffle
Ballad
Swing March
March Polka
Swing Waltz
Waltz
Metronome

RHYTHM CONTROLS

Snare Cancel
Rhythm Intro Preset and Downbeat Light
Rhythm Speed. . . Min/Max
Rhythm Volume. . . Min/Max
Rhythm Drum and Brush Balance. . . Min/Max
Rhythm/Start/Stop
Rhythm Start. . . Normal/Auto

GENIE

Magic Genie Chords
Chord Hold
Guitar Strum
Ukulele Strum
Piano Arpeggio
Harpsichord Arpeggio
Boogie Woogie Bass

MAGIC GENIE CHORDS

Key Note	Gives this Chord	Key Note	Gives this Chord
A1	A Major	D#1	D# E_b Major
A#1	A# B_b Major	E1	E Major
B1	B Major	F1	F Major
C1	C Major	F#1	F# G_b Major
C#1	C# D_b Major	G1	G Major
D1	D Major	G#1	G# A_b Major

MAGIC GENIE CONTROLS

Strum/Upbeat/Downbeat
A2 Lower Keyboard Key adds 7th to Magic Chord
Minor Footswitch
Strum Volume Control. . . Min/Max
Arpeggio Volume Control. . . Min/Mas

GENERAL FEATURES

Leslie Speaker
Stereo Flute Chorus Switch On/Off
Stereo Flute Leslie Switch. . . On/Off
Auxiliary Input Jack
Stereo Headphone Jack
Main and Leslie External Tone Cabinet Sockets
On/Off Switch (Main Organ)
Minimum Volume Control (On Power Supply)
Maximum Volume Control (On Power Supply)

CIRCUIT DESCRIPTION

SCHEMATIC 1

VIBRATO TONE GENERATORS & DIVIDERS

The tone generators consist of the Master Oscillator Q11, the Top Octave Synthesizers IC1, IC2 and the IC Dividers IC3-IC14. The Master Oscillator creates a high frequency signal which is applied to the Top Octave Synthesizers IC1 and IC2. Here the signal is divided to create 13 specific octave frequencies which are applied to the IC Dividers where they are divided in half several times, creating lower octave frequencies. These audio signals are then routed to various diode and audio keying circuits. The Vibrato Oscillator shifts the frequency of the Master Oscillator to create the vibrato effect.

Q1, Q2 & Q3 VIBRATO DELAY TRIGGER INVERTER & SWITCHER

Turning on the Vibra Harp, Piccolo, Violin or Orchestra Clarinet tabs applies a positive voltage via the Vibrato Delay Enable Line to the collector of Q1 and charges a 3.3 uf capacitor. Pressing an Upper Keyboard DC keyswitch applies a positive voltage pulse to the base of Q1, momentarily turning it on. When Q1 turns on, a pulse is developed across the 3.3 uf capacitor, lowering the voltage on the base of the Inverter Q2, turning it off. When Q2 turns off, a positive voltage is applied to the base of the Vibrato Delay Switcher. This turns Q3 on, grounding the Vibrato Oscillator, momentarily turning it off. Pressing the glide switch applies a positive voltage to the base of Q3, turning Q3 on and disabling the Vibrato Oscillator until the glide switch is released.

Q4, Q5 VIBRATO OSCILLATOR

The Vibrato Oscillator develops a continual low frequency (6.3 Hz) sine wave of sufficient amplitude to shift the frequency of the Master Oscillator high and low creating a vibrato effect. The oscillator output is applied to the Master Oscillator via a vibrato tabswitch contact, and also from the arm of Vibrato Depth Control VR1 to the CFG Master Oscillator Q220. It is also applied directly to the Tremolo Lamp Driver Q34.
Note: When the Vibrato tabswitch is turned on, the Vibrato Oscillator output bypasses Q9 and Q10 and the speed and depth of vibrato are controlled by the Vibrato Controls VR1 and VR3. Also, turning on the Piano tabswitch will not cancel vibrato.

Q6 VIBRATO ENABLER

Turning on the Hawaiian Guitar, Piccolo, Violin, Orchestral Clarinet or Vibrato tabs applies a positive voltage via the Vibrato Enable Line to base of Q6, Vibrato Enabler, turning it on. This causes the Piano Vibrato Killer Q7 to turn off, ungrounding the output of the Vibrato Oscillator.

Q7 PIANO VIBRATO KILLER

Turning on the Piano tabswitch applies positive voltage to the base of Q7 Piano Vibrato Killer, turning it on. This grounds the output of the vibrato oscillator cancelling vibrato.

Q9 ORCHESTRAL CLARINET VIBRATO DEPTH SWITCHER

Turning on the Orchestral Clarinet tab removes positive voltage from the base of Q9, turning it off and adding an 18K resistor in series with the vibrato output to the Master Oscillator. This reduces the amplitude of the vibrato waveform and gives a preset vibrato depth to the Orchestral Clarinet voice.

Q10 HAWAIIAN GUITAR VIBRATO DEPTH SWITCHER

Turning on the Hawaiian Guitar tab removes positive voltage from the base of Q10, turning it off and adding a 3.3K resistor in series with the 2.2K resistor to ground. This increases the amplitude of the vibrato waveform and gives a preset vibrato depth to the Hawaiian Guitar voice.

Q8 GLIDE SWITCHER

Pressing the glide switch applies positive voltage to the base of Q8, turning it on. This detunes the Master Oscillator by one semi-tone and creates the glide effect.

Q11 MASTER OSCILLATOR

The Master Oscillator Q11 develops a continual high frequency signal (approximately 2MHz) which is applied to the Top Octave Synthesizers IC1 and IC2, via the Buffers Q12 and Q13.

Q12, Q13 BUFFERS

The buffers act as an isolation stage between the Master Oscillator and the TOS, preventing any change in master oscillator frequency due to change in circuit load.

IC1, IC2 TOP OCTAVE SYNTHESIZERS
IC3-IC14 IC DIVIDERS

High frequency audio signal is applied to IC1 and IC2 where it is divided simultaneously to produce thirteen specific audio frequency signals. These signals are connected to upper and lower keyboard diode keying circuits, audio keyswitches and also to IC Dividers IC3-IC14, where they are divided in half several times to produce lower organ tones. The signal outputs are of a particular octave frequency and are shown boxed on Schematic 1. (The letter-number designation within these boxes refer to a specific octave frequency and should not be confused with a keyboard designation.)

SCHEMATIC 2

UPPER KEYBOARD DIODE KEYING TAB-SWITCHING, DC CONTROL CIRCUITS FOR WOW, SUSTAIN, PERCUSSION, SLOW ATTACK AND TREMOLO

UPPER KEYBOARD DIODE KEYING

Pressing an upper keyboard keyswitch applies positive voltage through a 10K and 33 ohm resistor to the upper keyboard diode keying circuits. This positive voltage is applied to the anodes of D17, 18, 19 and 20, turning them on and allowing audio signal from the tone generators to pass the 2, 4, 8 and 16-foot diode keying groups. Each diode shown represents 44 circuits. The 68K resistors for each footage are tied together in groups at their output and form the Diode Keying Groups. The positive voltage from each keyswitch also charges a 30 uf sustain capacitor which discharges upon releasing a key and holds diodes D17-20 on. The discharge rate of this capacitor is controlled by the sustain length regulation circuitry.

Q15 UPPER KEYBOARD KEYDOWN DETECTOR

Pressing an upper keyboard key lowers the voltage on the base of Q15. This turns Q15 on and supplies the keying voltage for Slow Attack, Wow, Vibrato Delay and Sustain Cancel circuits.

SUSTAIN LENGTH REGULATION

Q18, Q19 SUSTAIN LENGTH REGULATOR & DRIVER

Turning on any of the following upper keyboard tabs, Electric Piano, Piano, Harpsichord, Vibra Harp, Vibes, Hawaiian Guitar or Mandolin with Repeat applies a positive voltage via the Sustain Length Control Line to the base of Q19. The amplitude of this voltage determines the emitter voltage of Q19. When an upper keyboard key is released, current is drawn through the emitter base junction of Q18 (because of the lower potential at the emitter of Q19) from the 30 uf sustain capacitor. This turns on Q18 and discharges the sustain capacitor to -4V. When the capacitor has discharged to a point where the emitter of Q18 is approximately 1 volt higher than the emitter of Q19, Q18 shuts off and the remaining capacitor charge is applied to the anodes of Diodes D17-20 holding them on for the required sustain length. The lower the emitter voltage of Q19, the longer Q18 will remain on and the shorter the sustain length. Turning on the sustain tab overrides all preset sustain and the sustain length is then controllable by using the Custom Sustain Length Control VR7.

SUSTAIN CANCEL

Q16, Q17 SUSTAIN CANCEL & ENABLER

Turning on any of the following upper keyboard tabs — Electric Piano, Mandolin, Banjo, Symphonic Wow, Vibra Harp, Accordion, Harmonic 2-2/3 and 4, Vibes, Piccolo, Violin or Orchestral Clarinet — applies a positive voltage via the Sustain Cancel Enable Line to the base of Q17 turning it on. Pressing an Upper Keyboard key applies a positive pulse from the Keydown Detector Q15 to the base of Q16. This momentarily turns on Q16 grounding the common sustain line through Q17 and cancels the sustain of any previously played key. This gives a monophonic or one-note sustain effect to the above-mentioned voices.

SLOW ATTACK DRIVE

Q26 SLOW ATTACK MODULATOR DRIVER

Turning on any of the following upper keyboard tabs — Violin, Piccolo, Accordion or Orchestral Clarinet — applies a positive voltage via the Slow Attack Enable Line to the Collector of Q26, allowing it to operate when an upper keyboard keyswitch is pressed. Pressing an upper keyboard key applies a positive voltage through a 2.2M resistor and charges a .047 capacitor. The RC time constant of this capacitor and resistor cause a slowly rising voltage to be applied to the base of Q26. This turns on Q26, applying a steadily rising voltage to Pin 5 of IC34 gating the signal through IC34 and producing the slow attack effect for the above-mentioned voices.

Q25 SLOW ATTACK DISABLE

Turning on any upper keyboard percussion voice — Mandolin, Banjo, etc. — applies a positive voltage via the Percussion Enable and Slow Attack Disable Line to the base of Q25, turning it on. When Q25 turns on, it grounds the slow attack keying voltage and disables the Slow Attack Drive circuit. Note that the percussion effect will always override the slow attack effect.

PERCUSSION DRIVE

Turning on any of the following upper keyboard tabs — Mandolin, Banjo, Vibes, Harmonic 4 of Harmonic 2-2/3 — applies a positive voltage via the Percussion Enable and Slow Attack Disable Line to

CIRCUIT DESCRIPTION

the Percussion Drive circuitry. This enables the percussion drive circuitry allowing it to operate when an upper keyboard keyswitch is played. The following description assumes one of the above-mentioned tabs is on.

NON-REPEAT PERCUSSION DRIVE

Pressing an upper keyboard key momentarily lowers the voltage on the base of Q20, turning it off. When Q20 turns off, a positive voltage pulse is applied to the base of Q21 turning it on, momentarily lowering the voltage on the base of Q23. This causes Q23 to turn off, applying a positive voltage pulse to the base of Q22 and Q24 which turns them on. When Q22 turns on it keeps the base of Q23 from going positive, holding it off and lengthening the collector pulse of Q23. When Q24 turns on, it applies a positive voltage pulse of decaying amplitude to IC34 Pin 5 gating signal through IC34 and creating the percussion effect for the above-mentioned voices. The decay time of the percussion pulse is dependent on the discharge time of the .33 capacitor at the base of Q24. The discharge path for this capacitor is through Diode D14 and is varied by turning on the Percuss Repeat or Percuss Short/Long tabswitches.

REPEAT PERCUSSION DRIVE

With the Repeat tab in the on position, the Percussion Multivibrator continuously oscillates, applying a series of positive output pulses to the base of Q24. Q24 in turn applies a series of positive output pulse to Pin 5 of IC34 gating the signal through IC34 at the rate of repeat. Each time a key is pressed, the Keydown Trigger resets the Multivibrator for a positive output at the collector of Q23. The discharge rate of the .33 capacitor is faster with repeat on due to the lower voltage at the cathode of D14.

WOW DRIVE

Normally the output (Pin 9) of IC15D is low, when a positive pulse from the Upper Keyboard Keydown Detector Q15 occurs, the output of IC15D goes high. The feedback between IC15D and IC15B make them a Set/Reset Flip/Flop. At the same time the pulse from Q15 causes the Keydown Reset Q27 to discharge the .22 timing capacitor at the collector of Q29. The timing capacitor then charges through the Ramp Driver Q29 (giving a linear ramp). As the voltage on the capacitor increases, the output (Pin 4) of IC15A follows it. When the output of IC15A is .6V higher than the voltage setting of the Range Control VR6 the output (Pin 5) of IC15C (normally low) goes high, resetting the Set/Reset Flip/Flop causing the output of IC15D to go low. When IC15D goes low, the timing capacitor discharges through D23 and a 2.2M resistor. As the capacitor discharges, the output of IC15A follows it completing the drive waveform for the wow circuit. The output of IC15A is applied to the wow and Electric Piano filter and allows signal to pass through the filter at the amplitude of the drive waveform. The above description applies for the Pedal Wow with this exception: turning on the Pedal Wow tab keys the wow drive circuit from the Pedal Cancel Trigger Q76 instead of the Upper Keyboard Keydown Detector Q15.

Note: With the Pedal Wow tab on, the upper keyboard Symphonic Wow and Electric Piano voices will not have a wow effect.

ELECTRIC PIANO DRIVE

The Wow Drive Circuit operates exactly the same when the Electric Piano is on, except that the attack and decay times are shorter and the Range Control is disabled. These variations are accomplished by the following: turning on the Electric Piano tabswitch applies positive voltage to the base of Q30 and Q31 turning them on. When Q31 turns on the Range Control VR6 is bypassed disabling VR6 and giving the Electric Piano a preset range. When Q30 turns on, it performs two functions 1) it grounds the cathode side of D22 through a 680K resistor causing the timing capacitor to discharge through D22 giving a shorter decay time and 2) it lowers the voltage on the base of Q28 turning it on. This routes the positive voltage output from IC15D through a 15K resistor and causes the timing capacitor to charge at a faster rate giving a faster attack time.

TREMOLO DRIVE

The purpose of the Tremolo Drive Circuitry is to turn on the Lamp Driver Q35 allowing the 16-foot Main Flute signal to pass through Photocell P1 to the Main Preamp Q73. The 16-foot Flute signal is the only Flute signal that is channelled into the Main Amplifier. The following is a description of what occurs when turning on each voice which uses the 16-foot Main Flute signal.

ELECTRIC PIANO

Turning on the Electric Piano tab applies a positive voltage via Diode D28 to the base of Lamp Driver Q35. This turns Q35 on lighting the bulb in Photocell P1 lowering the resistance of the Photocell and allowing the 16-foot Main Flute signal to pass to Main Mixing Preamp Q73.

VIBRA HARP & VIBES

Turning on either the Vibes or Vibra Harp tab applies a positive voltage through Diode D30 or D31 to the base of Q35. At the same time a positive voltage is also applied through Diode D32 or D33 to the base of Q32. This turns Q32 on which connects the output of Q34 to the base of Q35. Since Q34 is driven by the Vibrato Oscillator its output is a low frequency sine wave. Applying this output to the base of Q35 causes a series of positive output pulses to develop at the Emitter of Q35. These positive pulses are applied to the Lamp in Photocell P1, gating the 16-foot Main Flute signal through P1, creating a tremolo effect for the Vibes and Vibra Harp voices. Turning on the Vibes or Vibra Harp tab also connects a positive pulse from the Upper Keyboard Keydown Detector Q15 to the base of Q35. This pulse is applied to the base of Q35 each time a key is pressed to insure a positive output pulse at the emitter of Q35.

FLUTE 16

Turning on the 16-foot Flute tabswitch applies a positive voltage through D29 to the base of Q35, turning it on and allowing the 16-foot Main Flute signal to pass to Main Mixing Preamp Q73. If the Leslie switch is turned on with the Flute 16 tabswitch, the positive voltage from the Flute 16 tab is also applied through Diode D34 to the base of Q33 Flute Tremolo Switcher. This turns on Q33 and connects the output of Q34 to the base of Q35. Since Q34 is driven by the Vibrato Oscillator its output is a low frequency sine wave, applying this output to the base of Q35 causes a series of positive output pulses to develop at the Emitter of Q35. These positive pulses are applied to the Lamp in Photocell P1, gating the 16-foot Main Flute signal through P1 creating a tremolo effect for the 16-foot main channel Flute signal.

SCHEMATIC 3

UPPER KEYBOARD FLUTE FILTERS, TAB-SWITCHES, DIODE KEYING & AUDIO KEYING GROUPS

Audio signal from the tone generators is divided into groups called Audio Keying Groups (2-2/3, 5-1/3) and Diode Keying Groups (2, 4, 8 and 16). These groups are filtered individually by the Upper Keyboard Flute Filters for each organ footage 2, 2-2/3, 4, 5-1/3, 8 and 16. After filtering, the signal is collected and amplified before being sent to other voicing circuits where the various organ voices are created. The 4, 8 and 16-foot Groups are combined through 8.2K resistors and routed to Reed/String Collector Amps for use on the Reed and String organ voices. The Flute filter outputs are applied to the Flute Preamps and then routed to the Leslie Volume Regulator, Reverb and Chorus Mixing preamp. The 16-foot Flute signal is also routed to the Main Mixing Preamps.

FLUTE FILTERS

Each Flute Filter consists of an RC filtering network and an operational amplifier. There are 7 filters for each Flute footage - two of which are shown on Drawing 3. A physical layout of the operational amplifiers is provided showing the code for IC numbers. Charts are provided indicating the operational amplifier IC number for a specific group of notes.

FLUTE SWITCHERS

The Flute Switchers are N-Channel FET Transistors which are normally conducting but are held off by a negative voltage at their gate. Turning on a Flute tabswitch cancels the negative voltage causing the switcher to conduct, allowing signal from the Flute Collector Lines to pass to the Flute Preamps.

Q39 HARMONIC 2-2/3 SWITCHER

The operation of Harmonic 2-2/3 switcher is identical to that of the Flute Switchers. Turning on the 2-2/3 Harmonic Tabswitch cancels the negative voltage on the gate of Q39 causing it to conduct. This allows signal from the Harmonic 2-2/3 Collector Line to pass to the input of the Percussion and Slow Attack Modulator IC34.

Q40 PERCUSSION 4 SWITCHER

The operation of the 4-foot Percussion switcher is identical to that of the Flute Switchers. Turning on the Vibes, Harmonic 2-2/3 or Harmonic 4 tabswitch, cancels the negative voltage on the gate of Q40 causing it to conduct and allowing signal from the 4-foot Percussion Collector Line to pass to the input of the Percussion and Slow Attack Modulator IC34.

IC29B MAIN FLUTE 16 COLLECTOR AMP

Audio signal from the 16-foot Main Flute Collector Line is applied to IC29B where it is amplified and applied to the input of Tremolo Photocell P1. Turning on the Flute 16 tabswitch enables Lamp Driver Q35 which lights the lamp in Photocell P1, allowing the signal to pass through P1 to Main Mixing Preamp Q73.

IC30A, B AND C 4, 8 AND 16 REED/STRING COLLECTOR AMPS

Audio signal from the 4, 8 and 16-foot Diode Keying Groups is combined and applied to its associated R/S Collector Amp. Here the signal is amplified before being connected to the input of its associated R/S Switcher.

Q43 8/16 OUTPHASER SWITCHER
The operation of the Outphaser Switcher is identical to that of the Flute Switchers. Turning on the Hawaiian Guitar, Accordion or Orchestral Clarinet tab, cancels the negative voltage at the gate of Q43 causing it to conduct. This allows the 8 and 16 R/S signal to combine and be routed through the 16 R/S Collector Amp to the input of the 16 R/S Switcher.

FLUTE PRESET
Turning the Flute Preset tab cancels the negative voltage on the 4, 8 and 16-foot Flute switchers, allowing them to turn on at the same time. The other Flute Preset contact shown on Drawing 2 removes the B+ to all upper keyboard voices (except Flute voices) cancelling them. The positive voltage now on the 'on buss' of this contact is applied via the Wow Disable Line to the Voltage Comparator IC15C disabling the wow circuit. This allows only the Flute voices of the organ to play.

Q46, Q47 FLUTE PREAMPS
Signal from the 2, 2-2/3, 4, 5-1/3, 8 and 16-foot Flute filters via the Flute switchers is applied to the Flute Preamps. Here the signal is amplified and transformed to a low impedance output signal. This signal is then routed to the Leslie Volume Regulator IC40, Reverb Driver IC33C and through the Flute Chorus Switch to the Chorus Mixing Preamp IC35A.

SCHEMATIC 4

LOWER KEYBOARD DIODE KEYING AND AUTO RHYTHM START

There are 44 Lower Keyboard DC Keyswitches. Pressing a Lower Keyboard key applies voltage (through Coil L5) to the anode of a diode D136 & D137. This allows audio signal from the Tone Generators to pass to the 4- & 8-foot Lower Keyboard Diode Keying Groups. The Diode Keying Groups are represented by a bold line on Drawing 5.

With the Magic Chord tab on, the A1-A2 Lower Keyboard keys are disabled by Accompaniment Killer Q215. At this time the output from the Magic Chord preamp is routed to the Lower Keyboard filtering circuits. With the Magic Chord tab on, the A2 Lower Keyswitch becomes the 7th switch. Pressing the A2 Keyswitch at this time applies a positive voltage to 7th Enable Q211 which adds the 7th component to the Magic Genie Chord being played.

RHYTHM START

Placing the Rhythm tabswitch in the start position, applies ground through a 10K resistor to the base of Q49 (Lower Keyboard Keydown Detector), lowering the voltage on its base and turning it on. This applies positive voltage to the base of Q54 (Rhythm Start) turning it on, which grounds the base of the Multi-Starter Q139, enabling the rhythm to start.

AUTOMATIC RHYTHM START

Placing the Rhythm Start tabswitch in the Auto position, removes ground from the base of Q54 (Rhythm Start) and ungrounds the auto start circuitry (Q50-Q53) at the base of Q54. Pressing a lower keyboard DC keyswitch lowers the voltage on the base of Q49 (Lower Keyboard Keydown Detector), turning it on. This applies positive voltage to the base of Q54, turning it on, grounding the base of the Multi-Starter Q139 and enabling the rhythm to start. At the same time, this positive voltage charges a 1 uf capacitor and a 5.6 uf capacitor at the collectors of Q51 (Auto Stop Switcher Enabler) and Q53 (Rhythm Auto Start), respectively. When the key is released, the 5.6 uf capacitor discharges onto the base of Q54 (Rhythm Start), holding it on and the 1 uf capacitor discharges onto the base of Q52 (Auto Stop Switcher) turning it on, grounding out any pulse applied to the base of Q53 from Pin 13 of IC44. When Pin 13 of IC44 goes low, Q50 switches off enabling Q51 to turn on, discharging the 1 uf capacitor to ground and turning off Q52. When Pin 13 goes high, a positive pulse is applied to the base of Q53 (since Q52 was switched off) turning Q53 on and discharging the 5.6 uf capacitor to ground. This removes voltage from the base of Q54, turning it off, which switches the rhythm off.
Note: Pin 13 of IC44 must first go low then high before a positive pulse can reach the base of Q53, switching the rhythm off. This causes the turn-off time of the rhythm to vary depending on the state of Pin 13 when the key is released.

SCHEMATIC 5

LOWER KEYBOARD TABSWITCHING, FLUTE FILTERING, GENIE MODULATOR & R/S COLLECTOR AMPS

Audio signal from the tone generators is divided into groups called Diode Keying groups. These groups are filtered individually by the Lower Keyboard Flute Filters. The Diode Keying Groups are also tied together through 8.2K resistors and form the Reed and String signal for the lower keyboard voices. The output from the Magic Chord preamp also connects to the F1-A#2 8-foot Flute Filter and the output from the Magic Genie 4-foot TOS connects to the B2-E2 4-foot Flute Filter.

LOWER KEYBOARD FLUTE FILTERS

The lower keyboard Flute filters consists of an RC filter network and an operational amplifier. There are 6 Flute filters for each footage, two of which are shown on Drawing 5. A physical layout of the operational amplifiers is provided showing the code for IC numbers. Charts are provided indicating the operational amplifier IC number for a specific group of notes.

FLUTE SWITCHERS

The 4- & 8-foot Flute Switchers Q56 and Q57 are N-channel FET transistors that are normally conducting but are held off by a negative voltage at their gate. Turning on the Flute 4- or 8-foot tabswitch cancels the negative voltage, turning on the switcher, allowing signal to pass to the Flute Mixing Preamp Q46 via the Lower Keyboard Flute Volume Control VR10.

IC29D, LOWER KEYBOARD 4 R/S COLLECTOR AMP

Audio signal from the 4-foot lower keyboard diode keying groups is combined through 8.2K resistors and applied to the input of the 4-foot lower keyboard R/S Collector Amps. Here this audio signal is amplified and routed to various voicing circuits on the R/S Quality Control Board. Turning on the Violina 4 tabswitch routes this signal via the lower keyboard String Volume Control VR9 to the Chorus Mixing Preamp IC35A. Turning on the Ukulele tab routes this signal to the input of the Genie Modulator IC31.

IC30D, Q58 LOWER KEYBOARD 8 R/S COLLECTOR AMP AND SWITCHER

Audio signal from the 8-foot lower keyboard Diode Keying Groups is combined through 8.2K resistors and applied to the input of the 8-foot lower keyboard R/S Collector Amp IC30D. Here the signal is amplified and routed to the 8-foot lower keyboard R/S Switcher Q58. The switcher is an N-channel FET which is normally conducting but is held off by a negative voltage at its gate. Turning on the Viola, Banjo, Piano or Guitar tabswitches cancels the negative voltage on the gate of Q58 causing it to conduct allowing audio signal to pass to the Genie Modulator for Banjo, Piano and Guitar voices, and via the lower keyboard String Volume Control to the Chorus Mixing Preamp for the Viola voice.

IC31, Q59, Q60 GENIE MODULATOR, GENIE ACCOMPANIMENT ENABLE & EMITTER FOLLOWER

Audio signal applied to the input (Pin 3) of the Genie Modulator via the 8-foot lower keyboard R/S Switcher or Ukulele tabswitch can only pass through the Modulator when a positive voltage is applied to Pin 5. With the rhythm off, the Genie Accompaniment Enable Q59 is off and a positive voltage through D145, via the off contact of the Genie voices tabswitch, is applied to Pin 5 of IC31. This allows signal to pass through the modulator unmodulated. Turning on the Genie voices tabswitch at this time will have no audible effect. With the rhythm on, a positive voltage is applied to the base of Q59 turning it on which removes the positive voltage at its collector. Positive voltage pulses are now applied through D146 from the Genie Modulator Driver Q154. These pulses gate the signal through the modulator at the speed of the rhythm. Turning on the Genie voices tabswitch at this time removes the positive pulses from Pin 5 and applies a steady DC voltage to Pin 5 causing the Genie voices to play as described when the rhythm is off. This signal is then passed to the Emitter Follower Q60 where it is transformed to a low impedance output signal and routed to various voicing circuits via the Genie Volume Control VR12.

Note: The Genie tabswitches perform two functions: 1) They allow signal to flow into the modulator from the 4- and 8-foot R/S Collector Amps, and 2) They unground the output from the Genie Volume Control allowing that signal to pass to various voicing circuits.

SCHEMATIC 6

MAIN MIXING PREAMPS, VOICING AND UPPER KEYBOARD R/S COLLECTOR AMPS

Audio signal from the R/S signal lines is routed via tabswitches to voicing circuits and preamps to create the various organ voices. The output of these circuits is applied to the Main Mixing Preamps before being routed to the Reverb Driver and Main Volume Regulator.

Q62-Q64 4, 8 AND 16 R/S SWITCHERS

Each R/S Switcher is an N-channel FET transistor which is normally conducting but is held off by negative voltage at the gate. Turning on a tabswitch that has a diode connected to either the 4-, 8- or 16-foot R/S enable line (see Drawing 2) cancels the negative voltage on the gate of its associated switcher - causing it to conduct, applying signal to the 4-, 8- or 16-foot R/S signal lines. Turning on Cello 16, Violina 4 or Viola 8 tabswitches routes signal from the 16-, 4- or 8-foot R/S signal lines through the Upper Keyboard String Volume Control VR14 to the Chorus Mixing Preamp IC35A.

IC34, Q67 PERCUSSION & SLOW ATTACK MODULATOR & EMITTER FOLLOWER

Violin 4, Mandolin, Accordion, Harmonic 2-2/3 and 4, Piccolo, Banjo and Vibes are the Percussion and Slow Attack voices of the organ. Turning on any of these tabs applies signal to the input (Pin 2 or 3) of IC34. Signal is gated through IC34 when positive voltage is applied to Pin 5 from the Percussion or Slow Attack Modulator Drivers Q24 and Q26. This creates the percussion or slow attack effects of the organ. The signal is then applied to the base of Q67 where it is transformed into a low impedance signal, before being applied to the Main Mixing Preamps.

IC33A UPPER KEYBOARD BANJO FILTER

The Banjo filter consists of an RC filter circuit and an operational amplifier. R/S 16 signal is applied to this circuit where it is filtered and amplified. Turning on the upper keyboard Banjo tabswitch, ungrounds the output of the filter allowing the signal to pass to the Percussion and Slow Attack Modulator.

Q68 HARPSICHORD EMITTER FOLLOWER

Turning on the Harpsichord tabswitch allows R/S 16 signal to pass to the base of Q68. This signal is transformed into a low impedance output signal and applied to the Kinura and Harpsichord Preamp Q65 and to the Main Mixing Preamp Q73.

Q65, Q66 KINURA AND HARPSICHORD PREAMPS

Turning on the Kinura or Harpsichord tabswitch allows signal from either the R/S 8 signal line or the Harpsichord Emitter Follower Q68 to pass to the Kinura and Harpsichord Preamps Q65 and Q66. Here the signal is amplified and voiced before being routed to the Main Mixing Preamp Q73. Audio signal from the Arpeggio Preamp Q228 is also applied to Q65 & Q66 via the Harpsichord Arpeggio tabswitch.

Q69, Q70 GUITAR AND LOWER KEYBOARD BANJO PREAMPS

Turning on the Oboe, Guitar Bass, Hawaiian Guitar, Lower Keyboard Banjo or Ukulele tabswitches allows signal to pass to the input of Q69 and Q70. Here the signal is amplified and voiced before being routed to Main Mixing Preamps. Audio signal from the Strum Preamp Q227 is also applied to Q69 and Q70 via the Ukulele Strum tabswitch.

IC33D, IC33B PIANO FILTER

Turning on the Piano, Trombone, Hawaiian Guitar lower keyboard Piano or Pedal Guitar tabswitch allows R/S 16 signal to pass to the Piano filter. Here the signal is voiced and amplified before being routed to the Main Mixing Preamp Q73. Audio signal from the Arpeggio Preamp Q228 is also applied to the Piano filter via the Piano Arpeggio tabswitch.

IC35C, IC35D TRUMPET FILTER

R/S 16 signal is applied to the Trumpet filter where it is voiced and amplified. Turning on the Hawaiian Guitar, Trumpet 16 or Orchestral Clarinet tabswitch ungrounds the output of the filter, allowing the signal to pass to Main Mixing Preamps.

IC36, IC37, Q71, Q72 WOW AND ELECTRIC PIANO FILTER AND EMITTER FOLLOWERS 1 AND 2

This circuit is a State Variable Filter that acts in conjunction with the 800P capacitors to form an RC low pass filter. Signal from the R/S 16 signal line or 8-foot Pedal Keyer Q91 is gated through the filter at the amplitude of the drive waveform applied to Pins 5 of IC36 and IC37. The output is a low impedance signal that is routed to the Main Mixing Preamps when the Symphonic Wow, Electric Piano or Pedal Wow tab is turned on. Turning on the Symphonic Wow tab also routes signal to the Chorus Mixing Preamp if the Electric Piano and Pedal Wow tabs are off.

Q73, Q74 MAIN MIXING PREAMPS

Audio signal from upper keyboard, lower keyboard and pedal R/S voicing circuits are routed to the Main Mixing Preamps Q73 and Q74. Here the signal is amplified and transformed into a low impedance output signal. This signal is then routed to the Main Volume Regulator IC39 and Reverb Driver IC33C. Audio signal from the Strum Preamp Q227 is also routed to the Main Preamps via the Guitar Strum tab.

SCHEMATIC 7

BASS PEDALS & LOWER KEYBOARD GENIE BASS

BASS PEDALS

Pressing a bass pedal causes the following:

1) A pulse is developed across the .22 capacitor (connected to the C1 Pedal Switch) causing the Pedal Cancel Trigger to operate.
2) A generator output Diode 152 is biased on, allowing tone generator signal to pass through Diode

D153 to the base of the Pedal Collector Amp Q78.
3) A 5.6 mfd capacitor is charged, which holds Diode D152 on after the pedal has been released.
4) The Pedal Keyer conducts applying a positive voltage to its Emitter Follower causing the Emitter Follower to conduct which allows signal from the 8- and 16-foot Pedal Dividers to pass to the 8- and 16-foot Pedal Keyers. The Pedal Keyer also delivers a positive pulse to the Piano Filter if the pedal tabswitch is in the Guitar Bass position.

Q76, Q77 PEDAL CANCEL TRIGGER
Pressing a pedal develops a pulse across the .22 capacitor connected to the C1 Pedal Switch. This momentarily lowers the voltage on the base of Q76 turning it off. When Q76 turns off, it applies a positive voltage pulse to the base of Q77; this causes Q77 to turn on, momentarily grounding the Pedal Keying Line which discharges any previously charged 5.6 uf pedal sustain capacitor. This turns off the signal path of the previously played pedal making sure that only the signal from the pedal being played enters the Pedal Divider. (If more than one signal at a time enters the Pedal Divider, rumble will occur.) The positive pulse from Q76 is also applied to the Wow Drive circuitry when the Pedal Wow tab is in the on position.

Q78 PEDAL COLLECTOR AMP
Audio signal from the Tone Generators is applied through a Diode D152 and D153 to the base of the Pedal Collector Amp each time a pedal is played. This signal is amplified to an amplitude sufficient for driving the Pedal Dividers IC14 and IC3.

IC14, IC3 8 AND 16 PEDAL DIVIDERS
Part of IC14 and IC3 is used as the 8- and 16-foot Pedal Divider audio signal is applied to the 8-foot divider where it is divided in half. The output of the 8-foot divider is applied as input to the 16-foot Pedal Divider where it is divided in half once again. The output signal from each divider is allowed to pass to its associated Pedal Keyer when Pedal Keyer Emitter Follower Q80 conducts and turns on Diodes D172 and D171.

Q79 PEDAL KEYER
Playing a bass pedal applies a positive voltage through a Diode D154 to the base and emitter of Pedal Keyer Q79. This causes Q79 to conduct applying a positive voltage to the base of the Pedal Keyer Emitter Follower. This voltage is also applied as a pulse to the anode of D173 turning it on. When D173 turns on it allows a short burst of 8-foot audio signal to pass through D175. This signal is routed to the Piano Filter when the Pedal tab is in the Guitar bass position and creates the Guitar bass Harmonic.

Q80 PEDAL KEYER EMITTER FOLLOWER
Positive voltage from the Pedal Keyer is applied to the base of the Pedal Keyer Emitter Follower Q80. This causes Q80 to conduct applying a positive voltage to Diodes D172 and D171 allowing signal from the 8- and 16-foot pedal dividers to pass to the 8- and 16-foot Pedal Keyers, Q91 and Q90. When Q80 conducts, a positive voltage is also applied to the base of the Genie Bass Killer Q89. The positive voltage applied to the base of Q80 also charges the .22 capacitor and with the pedal sustain or the Pedal Guitar Bass/String Bass tab in the on position, this capacitor discharges onto the base of Q80 holding it on momentarily. This allows signal from the pedal divider to pass to the Pedal Keyers after the pedal has been released and gives the pedal sustain effect.

Q90 PEDAL KEYER 16
Audio signal from the 16-foot Pedal Divider passes through the 16-foot Pedal Keyer and is transformed into a low impedance signal. This signal then combines with the output of the 8-foot Pedal Keyer Q91 and is routed, via the bass volume tabs, to the input of the Bass Mixer Q92 when the Pedal tabswitch is in the 16-8 position.

Q91 PEDAL KEYER 8
Audio signal from the 8-foot Pedal Divider passes through the 8-foot Pedal Keyer and is transformed into a low impedance signal. This signal is then routed, via the bass volume tabs, to the input of the Bass Mixer Q92 when the pedal tab is in the 8-foot position. The output signal from Q91 also mixes with the output of the 16-foot Pedal Keyer Q90 and is routed, via the bass volume tabs, to Bass Mixer Q92 when the pedal tabswitch is in the 16-8 position. Turning on the Pedal Wow tab, routes this signal to the Wow and Electric Piano Filter.

Q89 GENIE BASS KILLER
The Genie Bass Killer Q89 has a positive voltage applied to its base from the Pedal Keyer Emitter Follower Q80 each time a pedal is played. This voltage causes Q89 to turn on which grounds the output of the Genie Bass Emitter Follower Q88 cancelling the Lower Keyboard Genie Bass until the pedal is released. This makes it possible to play the bass pedals at various intervals while the Genie Bass is being used.

Q92 IC35B BASS MIXER & BASS FILTER
Audio signal from the 16-, 8-foot pedal keyers and the Genie Bass Emitter Follower is applied to the

Mixer Q92 where it is amplified and voiced for proper tonality. The signal is then applied to the Bass Filter IC35B where it is filtered before being routed to the Main Volume Regulator, Main Output Amp, Leslie Volume Regulator and the Reverb Driver.

LOWER KEYBOARD GENIE BASS

Q81-Q83 HI & LO BASS SELECTORS

With a Rhythm on the output from Pin 26 of the ROM IC45 is applied to the base of Q81 and Q82. When Pin 26 is high, the Hi Bass note from Pin 6 of the CFG IC49 is grounded out through Q81 and the Lo Bass note from Pin 7 of the CFG is allowed to pass to the base of Divider Driver Q84. When Pin 26 goes low, Q83 is turned on through Q82 grounding out the Lo note allowing the Hi note to reach Q84. With no Rhythm on the bases of Q81 and Q82 are held high allowing only Lo Bass signal to pass to Q84. In the Boogie Woogie Bass mode a positive voltage is routed from the Magic Chord tab to the bases of Q81 and Q82 allowing the signal output from Pin 7 of the CFG to reach the base of Q84. Note: In the Boogie Woogie mode of operation there is no audio signal output from Pin 6 of the CFG. The positive voltage from the Magic Chord tab holds Q83 off, assuring a constant signal path for the Lo-Root output Pin 7 of the CFG.

Q84, PART OF IC44, DIVIDER DRIVER & GENIE BASS DIVIDER

Audio signal from Pins 6 & 7 of the CFG IC49 is applied to Q84 where it is amplified. This signal is applied to the Genie Bass Divider IC44 where its frequency divided exactly in half. The signal output from the Divider is then applied to the Genie Bass Keyer Q87.

Q85, Q86 GENIE BASS PULSE DETECTOR & GENIE BASS DRIVER

Turning on a rhythm triggers the Bass Pulse Detector from the Boogie Woogie Bass Triggers or Pin 22 of IC45 (depending on the position of the Boogie Woogie Bass tab). When the trigger is low, voltage on the base of Q85 is lowered, causing it to conduct. A positive voltage is then applied to the base of Q86, causing it to conduct which applies positive voltage to the Genie Base Keyer Q87, gating the base signal through the keyer at the speed of the rhythm. When the trigger goes high, Q85 turns off, causing Q86 to turn off, shutting off the signal path through the Genie Bass Keyer.

Turning the rhythm off with the rhythm start tabswitch in the normal position, grounds the cathode of Diode D169. This lowers the voltage on the base of Q85, turning it on, which applies a steady positive voltage to Q86, holding it on, creating a constant signal path through the Genie Bass Keyer Q87, and allowing the Lo bass signal to pass unmodulated.

Note: With the rhythm off and rhythm start in the normal position, the cathode of D170 is also grounded. This creates a voltage divider network through the 560 ohm and adjusts the DC level on the base of Q86.

Q87 GENIE BASS KEYER

Audio signal from the Genie Bass Divider is applied to the Genie Bass Keyer Q87. Each time a positive pulse from the Genie Bass Driver Q86 is applied to Q87, it allows audio signal to pass through Q87. This signal is then applied to the Genie Bass Emitter Follower Q88.

Q88 GENIE BASS EMITTER FOLLOWER

Audio signal from the Genie Bass Keyer is applied to the base of Q88 where it is transformed to a low impedance output signal before being routed via the bass tabswitches to the Guitar Preamp Q69 and/or the Bass Mixer Q92.

SCHEMATIC 8

AUTOMATIC ORGAN COMPUTER (AOC)

Automatic Organ Computer (AOC) consists of Upper Keyboard AOC keyswitches (C1-C4), Lower Keyboard DC keyswitches (A1-C3), and in the Magic Chord mode the Magic Genie AOC Decoder is used in place of the first 12 DC keyswitches. Listed below is an example of what happens when a C Major chord is held on the Lower Keyboard and the C4 Upper Keyboard key is pressed.

1) With the AOC tabswitch on, holding a three-finger or a one-finger Magic C Major chord (C, E & G) on the Lower Keyboard applies positive voltage (from the A1-C3 Lower Keyboard keyswitches or the Magic Genie AOC Decoder) to the C, E & G AOC Drivers. Here the voltage is amplified and applied to the emitters of all the C, E & G AOC Keyers Q94 via Diodes D178.
2) Upon pressing the Upper Keyboard C4 Key:
    a) the C4 DC keyswitch contact (see Schematic 2) receives a positive voltage from its on buss and keys the C4 note through the Upper Keyboard Diode Keying circuitry.
    b) the C4 AOC keyswitch contact is grounded by its on buss which lowers the voltage on the base of nine AOC keyers - namely C#3, D3, D#3, E3, F4, F#4, G4, G#4 and A4. Since in

this range only E3 and G4 have voltage applied to their emitters from the Lower Manual keyswitches or the Magic Genie AOC Decoder (via the AOC Drivers) they are the only two AOC keyers that will conduct applying voltage to the Upper Keyboard E3 and G4 Diode Keying circuit. Thus, E3 and G4 will be heard along with C4.

SCHEMATIC 9 & 11

AUTOMATIC RHYTHM

The Clock Multivibrator oscillates, producing a square wave output at the collector of Q141. This output is applied to the strobe delay transistor and through Divide-by-two D Flip Flop IC55A to the Resetable Counter. The Resetable Counter divides the input from IC55A by two, between Pins 10 & 11, 11 & 12, 12 & 13 and 13 & 14. The combined outputs of Pins 10 - 14 are applied to Brush Decoder circuits, which determine the brush length of some rhythms and also to Pins 35-39 of the Read Only Memory (ROM). Within the ROM, the combined inputs from the counter are decoded which results in a positive voltage appearing on one of the 32 internal decoder lines. As the combined inputs from the counter change, this positive voltage shifts in succession from the 1st through the 32nd decoder line, giving 32 possible rhythm timing points. (In the case of triplet or waltz rhythms, the counter is reset before counting through 32 points.) The Decoder Lines then connect through gating circuits to matrix circuits. Turning on a Rhythm Selector switch connects the strobe pulse to the ROM. The strobe pulse enables the gating circuit for the rhythm chosen. This allows the voltage on the decoder line, that is positive at this time, to pass through the matrix where it is inverted and routed out of the ROM to the correct instrumentation circuit for that timing point and rhythm. The instrumentation circuits produce the rhythm voice which is then amplified and applied to the rhythm output amp.

RHYTHM CLOCK
(Schematic 11)

Q1 MULTI-STARTER

Pressing the start tabswitch (or pressing a lower keyboard key with the Rhythm Start tab in the auto position) lowers the voltage on the base of the multistarter Q139. Lowering the voltage at this point performs three functions: 1) A pulse is created across the .05 capacitors applying a negative pulse to Pins 3, 5 and 6 of the Resetable Counter, thereby resetting the counter to timing point 1 (Pins 10-14 will be positive at this time); 2) Multi-Starter Q139 turns on supplying voltage to the Clock Multivibrator Transistor Q141, enabling the clock to run, and 3) Positive voltage is applied to Genie Accompaniment Enable Q59 (see Q59).

Q141, Q142 CLOCK MULTIVIBRATOR

A positive voltage from the Multi-starter is applied to the Clock Multivibrator which enables it to run. The Clock runs continuously producing a square wave output at the collector of Q141. The positive edge of this output triggers the Boogie Bass pulse dividers and the resetable counter and the negative edge triggers the strobe delay transistor. The tempo the clock runs at is controlled by the rhythm tempo control and various slwo down circuits.

RHYTHM STROBE PULSE

The rhythm strobe pulse is developed at the collector of the Rhythm Strobe Keyer Q171. Selecting a rhythm connects this pulse to the ROM where it enables the 32 ROM decoder lines, allowing them to trigger the instrumentation circuits. The strobe pulse is slightly delayed in relation to the ROM decoder outputs. This allows the decoder functions to stabilize before the strobe pulse enables their output.

Q172 IC52A & Q214 STROBE DELAY, GATE & DRIVER

When the output of Clock Transistor Q141 is low, a negative pulse is created across the .01 capacitor at the base of Q172. This lowers the voltage on the base of Q172 turning it off, creating an output pulse at its collector that is one clock pulse delayed. This pulse is then routed to Pin 6 of Strobe Gate IC52A (shown on Drawing 13). The other input to IC52A on Pin 5 is the divided-by-2 clock frequency. The output of IC52A will be the pulse width of the strobe pulse at the frequency of the divide-by-2 clock. When the output of IC52A is high, Q214 is turned on momentarily lowering the base voltage of the Strobe Keyer (Q167, 169 or 171) that is in operation at the time.

Q171 RHYTHM STROBE KEYER

With the Intro off, the emitter and base of Q171 are positive. When Q214 conducts, it momentarily lowers the base voltage on Q171 causing it to turn on. This develops a positive output pulse at the collector of Q171. Turning on a rhythm selector switch connects this pulse to the ROM input for the rhythm selected. This pulse is routed to the gating circuit for that rhythm and allows the output from the ROM decoder to pass to the rhythm matrix, where the instrumentation circuits for that timing point are selected.

IC44 RESETABLE COUNTER

The Resetable Counter is a five-stage divide-by-2 divider, the output of each stage connected to the input of the next. The 1st through 5th divider outputs are Pin 10 through 14, respectively. Applying a negative pulse to Pins 3, 5 and 6 resets the counter to timing point 1 (at this time all five outputs are positive). The five outputs are applied as input to the ROM and are also used to trigger the reset, brush decoder, strum and boogie bass circuits.

IC45 READ ONLY MEMORY (ROM)

The five inputs from the Resetable Counter are applied to the ROM. These inputs are decoded which results in a positive voltage appearing on one of the 32 internal decoder lines. There is a separate matrix for each rhythm pattern and each matrix has a gating circuit between it and the 32 decoder lines. Turning on a rhythm switch connects the strobe pulse to the gating circuit for the rhythm selected. The strobe pulse enables the gating circuit and allows the voltage on the positive decoder line to pass to the matrix. Here the voltage is inverted and routed to the instrumentation circuits for that timing point and rhythm. As the inputs to the ROM change, the positive voltage counts down the 32 decoder lines one at a time and each time it is pulsed through the matrix by the strobe pulse. This creates the 32 timing points for the rhythm.

Q143 RESET INVERTER

The Reset Inverter has positive voltage pulses applied to its base from the Waltz Reset Line, the Intro End Rhythm Reset Line, the Intro Resetable Counter Reset Line and the Intro Hold Reset. Each time a positive pulse is applied to the base of Q143, it conducts creating a pulse across the .01 capacitors at the anodes of D192 and D193. This momentarily removes the positive voltage on Pins 3, 5 and 6 of the Counter IC44, which resets the counter to the first rhythm timing point. At this time Pins 10-14 are positive.

TRIPLET TIMING

The Ballad, Swing March, Dixie, Swing and Shuffle rhythms are triplet timing rhythms. This means that they only use 24 of the available 32 rhythm timing points. The purpose of the triplet circuitry is to reset the counter to the first timing point after 24 timing points and also to slow down the clock multivibrator.

Q157, Q158 TRIPLET, CLOCK SLOW DOWN SWITCHER & RESET ENABLE, TRIPLE RESET

Turning on the Ballad, Swing March, Dixie, Swing or Shuffle rhythm selector switch applies a ground to the Triplet Enable Line. This lowers the voltage on the base of Q157, turning it on. When Q157 turns on, it applies a positive voltage to two places: 1) Through Diode D206 and a 10K resistor to the clock slow down line and 2) Through Diode D207 to the collector of Q158. Q158 is normally held on by a positive voltage through Diodes D208, D209 or D210. When the 24th timing pulse is reached, the outputs of the counter which are connected to these diodes will all be low. This causes Q158 to turn off allowing its collector and Pins 5 and 6 of the counter to go positive. On the next clock pulse a positive voltage is applied to the base of Q158 turning it on. This creates a negative pulse on Pins 5 and 6 of the counter and resets all the counter outputs to positive or back to the first timing point.

Q155 SWING MARCH, CLOCK SLOW DOWN SWITCHER

Turning on the Swing March, triplet rhythm applies a ground to the Swing March slow down line. This lowers the voltage on Q155 causing it to turn on. When Q155 turns on, it applies a positive voltage to the clock slow down line. This voltage is higher than the voltage applied to the clock from Q157 and causes the clock to run slower for the Swing March rhythm.

WALTZ TIMING

The Waltz and Swing Waltz rhythms are three quarter time rhythms. This means that they only use 18 of the available 32 rhythm timing points. The purpose of the waltz circuitry is to reset the counter to the first timing point after 18 timing points and also to slow down the clock multivibrator.

Q159, Q160 WALTZ CLOCK SLOW DOWN SWITCHER & RESET ENABLE, WALTZ RESET

Turning on the Waltz or Swing Waltz rhythm selector switches applies a ground to the Waltz enable line. This lowers the voltage on the base of Q159 turning it on. When Q159 turns on, it applies a positive voltage to two places: 1) Through Diode D211 and a 10K resistor to the clock slow down line and 2) Through Diode D212 to the collector of Q160. Q160 is normally held on by a positive voltage through Diode D214 or D215. When the 18th timing pulse is reached, the outputs of the counter that are connected to these diodes will all be low. This turns Q160 off, allowing its collector to go positive. This positive voltage is applied as pulse to the base of the Reset Inverter, turning it on which applies a negative pulse to Pins 3, 5 and 6 of the counter. This resets all the counter outputs to positive or back to the first timing point.

BRUSH LENGTH CONTROL
(See Brush Keying)

The length of the brush voice for each rhythm (except for the Waltz, Swing March, Swing and Rock I rhythms, which do not use the brush voice) is regulated by varying the discharge rate of the 8 uf capacitor at the emitter of the Brush Keyer Q197. Turning on one of these rhythm selector switches connects a resistor to ground from the "on" of the selector switch to the Brush Length Control Line. The value of the resistance regulates the discharge rate of the 8 uf capacitor, thereby regulating the length of the brush voice. The length of the brush voice for some of these rhythms varies at different timing points. Turning on one of these rhythms enables a decoder circuit, which will allow a positive voltage to reach the base of the Brush Length Regulator Q149 at certain timing points. These pulses turn on the Brush Length Regulator adding a 5.6K resistor to ground to the brush length control line. This causes the 8 uf capacitor to discharge faster, giving a shorter brush voice for the timing point when Q149 is on.

Note: The 5.6K resistor added to ground by the Brush Length Regulator parallels the resistance to ground from the "on" of the rhythm selected. This means there is less resistance to ground when Q149 is turned on, causing the 8 uf capacitor to discharge faster.

Q145, Q146, Q148 ROCK II & ROCK III BRUSH DECODER ENABLERS & BRUSH DECODER

Turning on the Rock II or III rhythm selector switches connects a 15K resistor to ground from the Brush Length Control Line and also allows positive voltage to pass through Diode D236 or D237 to the base of Q146. This positive voltage turns on Q146 removing positive voltage from the base of Q145 which now turns off and ungrounds the outputs of Diodes D199 and D200. Each time Pin 12 of the Counter IC44 goes high, a positive voltage will be applied through D199 to the base of Q149. Positive voltage will only be applied to the base of Q149 from D200 when Pin 13 of IC44 is high and Pin 11 is low. When Pin 11 is low, the Rock II and III decoder turns off and allows any positive voltage on Pin 13 to pass through D200 to the base of Q149. Positive voltage applied through D199 or D200 to the base of Q149 turns Q149 on which connects a 5.6K resistor in parallel with the 15K resistor to ground from the Brush Length Control Line. This causes the 8 uf capacitor at the emitter of the Brush Keyer Q197 to discharge faster giving a shorter brush length at the timing points when Q149 is on.

Q147 SAMBA, BOSA NOVA & LATIN ROCK BRUSH DECODER

Turning on the Samba, Bosa Nova or Latin Rock rhythm selector switches connects a 15K resistor to ground from the Brush Length Control Line and also allows positive voltage to pass through Diode D238, D239 or D240 to the collector of Q147. If Pin 12 of the Counter IC44 is low, Q147 is off and this positive voltage will pass through D197 to the base of Q149. If Pin 12 of IC44 is high, Q147 will turn on and ground the path through D197 to the base of Q149. Positive voltage applied through D-197 to the base of Q149 turns Q149 on which connects a 5.6K resistor in parallel with the 15K resistor to ground from the Brush Length Control Line. This causes the 8 uf capacitor, at the emitter of the Brush Keyer Q197, to discharge faster giving a shorter brush length at the timing points when Q149 is on.

Q150 MARCH POLKA BRUSH DECODER

Turning on the March Polka Rhythm Selector Switch connects a 33K resistor to ground from the Brush Length Control Line and also allows positive voltage to pass through to the collector of Q150. If Pin 25 of the ROM IC45 is low, Q150 will be off and this positive voltage will pass through D198 to the base of Q149. If Pin 25 of IC45 is high, Q150 will turn on and ground the path through D198 to the base of Q149. Positive voltage applied through D198 to the base of Q149 turns Q149 on which connects a 5.6K resistor in parallel with the 33K resistor to ground from the Brush Length Control Line. This causes the 8 uf capacitor, at the emitter of the Brush Keyer Q197, to discharge faster giving a shorter brush length at the timing points when Q149 is on.

Q149 BRUSH LENGTH REGULATOR

This transistor is only enabled when a rhythm having more than one brush length is on. It is turned on from several decoder circuits depending on the rhythm selected. When Q149 turns on, it connects a 5.6K resistor to ground from the Brush Length Control Line. This shortens the discharge time of the 8 uf capacitor at the emitter of the Brush Keyer Q197, thereby creating a shorter brush length.

CYMBAL LENGTH CONTROL
(See Cymbal Keying)

The rhythms using the Cymbal voice are Ballad, Swing March, Waltz, Rock I, II and III, Samba, Swing, Dixie and Bosa Nova. The length of the Cymbal voice for these rhythms is regulated by varying the discharge rate of the 8 uf capacitor at the emitter of the Cymbal Keyer Q193. Turning on one of these rhythm selector switches, except Waltz, Dixie or Swing connects a resistor to ground from the on of the selector switch to the Cymbal length control line. The value of resistance regulates the discharge rate of the 8 uf capacitor thereby regulating the length of the Cymbal voice. (The Waltz rhythm has a long Cymbal voice and no resistor is connected to ground from the Cymbal length control line when this rhythm is turned on). The length of the Cymbal voice for Dixie and Swing is regulated by the Dixie and Swing Cymbal length regulator. Turning on one of these rhythms enables the Dixie and Swing Cymbal decoder which will allow a positive voltage to reach the base of the Cymbal Length Regulator Q152, connecting a 5.6K resistor to ground from the Cymbal Length Control Line. This causes the 8 uf capacitor to discharge faster giving a shorter Cymbal voice for the timing point when Q-152 is on.

Q151, Q152 DIXIE, SWING CYMBAL DECODER & LENGTH REGULATOR

Turning on the Dixie or Swing rhythm allows positive voltage to pass through Diode D339 or D340 (shown on Drawing 13) to the collector of Q151. If Pin 25 of the ROM IC45 is low, this positive voltage passes to the base of Q152 and turns it on. When Q152 turns on, it connects a 5.6K resistor from the Cymbal length control line to ground. This causes the 8 uf capacitor at the emitter of the Cymbal Keyer Q193 to discharge faster, thereby giving a shorter Cymbal length when Q152 is on. When Pin 25 of IC45 is high, Q151 turns on and grounds the base of Q152, turning it off.

Q153, Q154 MODULATOR KEYER & DRIVER

Turning on the rhythm allows Q153 to be turned on by negative pulses from Pin 23 of IC45. When Pin 23 of IC45 goes low, Q153 conducts and charges the .27 capacitor at the base of Q154. When Q153 turns off, this capacitor discharges onto the base of Q154 and turns it on. This applies a positive voltage pulse to Pin 5 of IC31 and gates the input signal through IC31 for the duration of the discharge time. The discharge time of the .27 capacitor is controlled by the state of IC45 Pin 25. If Pin 25 is high the .27 will discharge slowly, holding Q154 on longer, creating a long signal pulse. If Pin 25 is low, the .27 will discharge faster through Diode D205 holding Q154 on only for a short time, creating a short signal pulse.

INTRO

The Intro switch is a momentary switch which activates the Intro Latch circuit. With the Intro Latch on, positive voltage appears at the collector of Q165. This voltage disables the rhythm strobe and also (depending on the rhythm selected) enables either the Intro 1 or 2 Strobe Keyer. The outputs of the Intro 1 and 2 Strobe Keyers are connected to the ROM where they perform the same function as the rhythm strobe - (see Circuit Description for Rhythm Strobe). Turning on the Waltz or Swing Waltz rhythm selector switches removes the positive voltage from the "on" of the Intro switch by applying a ground via the Intro disable line. This disables the Intro on these two rhythms.

Q162, Q163 INTRO LATCH

Pressing the Intro switch momentarily applies a positive voltage to the base of Q163 turning it on. When Q163 turns on, it lowers the voltage on the base of Q162. This causes Q162 to turn on which reapplies voltage to the base of Q163 and holds it on. These two transistors remain latched in this manner for the duration of the Intro set. With Q163 held on, a positive voltage is applied to the base of the Intro Switcher Q164, and also to the bases of Q216, Q223 & Q224 disabling the Strum, Arpeggio and Boogie Bass Triggers (see Drawing 13).

Q164 INTRO SWITCHER

Positive voltage from Q163 is applied to the base of Q164 causing Q164 to turn on. When Q164 turns on, it performs two functions: 1) It lowers the voltage on the base of the Intro Enable Q165 turning it on, and 2) It momentarily lowers the voltage on the base of the Intro Reset Q140, via the Intro Clock Reset Line, and turns it on. At the end of the Intro set, the collector of Q164 goes positive and applies a positive pulse through Diode D216 to the base of the Reset Inverter Q143. This causes Q143 to conduct which applies a negative pulse to Pins 3, 5 and 6 of the counter. This resets the counter and insures that the rhythm will start at the first timing point.

Q140 INTRO RESET

The voltage on the base of Q140 is lowered when the Intro Switcher Q164 turns on. This causes Q140 to momentarily conduct bypassing Clock Transistor Q141 and resetting the collector of Q141 to a positive output for the start of the Intro.

Q165 INTRO ENABLE

When the Intro Switcher Q164 conducts, the voltage on the base of Q165 is lowered, causing it to turn on. When Q165 turns on, it performs four functions:

CIRCUIT DESCRIPTION

1) It provides the voltage supply for the Intro 1 and 2 Strobe Enable circuits; 2) It applies voltage to the base of Q144, lighting the Intro Lamp; 3) It applies a positive pulse through Diode D217 to the base of Q143, causing Q143 to conduct. This creates a negative pulse on Pins 3, 5 and 6 of the Counter IC44 resetting the counter for positive output for the start of the Intro, and 4) It neutralizes the 10K load through Diode D227, causing the voltage to rise on the base of the Rhythm Strobe Disable Q170.

Q170 RHYTHM STROBE DISABLE

When the Intro Enable Q165 conducts, it applies positive voltage through Diode D227 which neutralizes the 10K load there. This causes the voltage to rise on the base of Q170 which turns it off. When Q170 turns off, it removes the voltage supply to the Rhythm Strobe Transistor Q171, disabling the rhythm strobe pulse.

Q168, Q169 INTRO 1 STROBE ENABLE & STROBE KEYER

The Intro 1 strobe is used for Intro on all rhythms except triplet rhythms. With a rhythm on that is not a triplet, the positive voltage from the Intro Enable Q165 is applied to the base and emitter of Q168. The base voltage will be lower because of the 10K load through Diode D226 and Q168 will conduct and supply positive voltage to two places: 1) Through Diode D229 and a 3.3K resistor to the Clock Multivibrator. This slows down the clock for the Intro set and 2) Through Diode D230 to the emitter and base of the Intro 1 Strobe Keyer. Each time the output from the Strobe Driver Q214 is low, Q169 will conduct - producing a strobe pulse at its collector. This pulse is then connected to Pin 13 of the ROM and performs the same function as the rhythm strobe. (See Rhythm Strobe circuit description.)

Q166, Q167 INTRO 2 STROBE ENABLE STROBE KEYER

The Intro 2 strobe is used for Intro on triplet rhythms. With a triplet rhythm on, ground is applied to Diode D221 via the Intro 2 enable line. This causes the voltage from the Intro Enable Q165 to be applied to the base and emitter of the Intro Strobe Enable Q166. The base voltage will be less than the emitter voltage and Q166 will turn on and apply positive voltage to three places: 1) Through Diode D225, neutralizing the 10K load there and preventing a voltage drop on the base of Q168 which keeps Q168 from conducting, thereby disabling the Intro 1 Strobe; 2) Through Diode D222 to the emitter of the Ballad, Intro Clock Slow Down Switcher Q165 and 3) To the emitter and base of the Intro 2 Strobe Keyer. Each time the output from the Strobe Driver Q214 is low, Q167 will conduct, producing a strobe pulse at its collector. This pulse is then connected to Pin 14 of the ROM and performs the same function as the rhythm strobe. (See Rhythm Strobe circuit description.)

Q156 BALLAD, INTRO CLOCK SLOW DOWN SWITCHER

This transistor is only used when the Ballad Rhythm is on and the Intro tab is activated. Positive voltage is supplied to the emitter of this transistor from Q166 through Diode D222. With the Ballad rhythm selector switch on, ground is applied to Q156's base via the Ballad Intro Slow Down Enable Line. This lowers the voltage on the base of Q156 and turns it on. When Q156 turns on, it applies positive voltage through a 1.8K resistor to the Clock Multivibrator and slows down the clock for this Intro set.

Q161 INTRO END SWITCHER

At the end of the Intro sequence Pin 14 of the Resetable Counter IC44 goes low, momentarily lowering the voltage on the base of the Intro End Switcher Q161. This turns on Q161 which applies positive voltage to the base of Intro Latch Transistor Q162. This turns off Q162 which removes positive voltage from the base of Latch Transistor Q163 which also turns off. This removes positive voltage from the base of the Intro Switcher Q164 and it turns off, removing the load from Intro Enable Q165 which also turns off. When Q165 turns off, the 10K load through D227 is no longer neutralized and a voltage drop results on the base of Q170 Rhythm Strobe Disable. This causes Q170 to turn on, supplying voltage to the Rhythm Strobe Transistor Q171 and the rhythm voice resumes playing.

Q173 INTRO HOLD RESET

The Intro Hold Reset only functions when the Intro Tab is being held on or is pressed directly after the Intro set. Positive voltage is applied to the collector of Q173 from the Intro Tab, but Q173 is held on during the Intro set by positive voltage from Pin 14 of IC44 causing its collector to be at a low level. At the end of the Intro set, Pin 14 makes a negative transition turning off Q173 which applies a positive voltage to reset Inverter Q143. This resets the Counter IC44 back to the first timing point for the next Intro set.

Note: This reset makes it possible to play two Intro sets in succession. If the Intro switch was held on and this reset failed to function, a dead measure would exist between Intro sets.

CIRCUIT DESCRIPTION

INSTRUMENTATION
(See Schematic 9)

The instrumentation circuits produce the instrument voices for the rhythm. The generator circuits are tied together at their output and applied to the rhythm preamp where the voices are amplified and sent via the rhythm volume control to the rhythm output amp.

Q176, Q177 BASS DRUM PULSE AMP & GENERATOR

Negative pulses from IC45 Pin 40 of the ROM are applied to the base of the Bass Drum Pulse Amp Q176, lowering the voltage and momentarily turning Q176 off. When Q176 turns off, voltage at the junction of the .82 capacitors is lowered, causing the Bass Drum Generator to oscillate, producing a short audio signal of diminishing amplitude. This signal is then amplified and applied to the rhythm preamp.

Q178-Q183 RHYTHM GENERATORS

The rhythm generators are tuned resonant circuits with an output amplifier transistor. Negative voltage pulses from the ROM IC45 cause these circuits to oscillate, producing short audio signals of diminishing amplitudes. The outputs are then combined and applied to the rhythm preamp.

Q188, Q189, Q190 NOISE GENERATOR, PREAMP, AMP

The noise generator produces a random noise signal which is then amplified by the preamp and amp. The output for the noise signal is the collector of Q190 and when either the Snare, Cymbal or Brush noise keyer circuits operate, this signal is passed through Diode D277, D282 or D283 to the Snare, Cymbal or Brush voicing amps.

Q184, Q186, Q187 SNARE NOISE PULSE DETECTOR, KEYER & VOICING AMP

When Pin 6 of the ROM IC45 is low, the voltage is lowered on the Hi-Drum and Lo-Drum generators causing them to oscillate producing the Hi and Lo Drum voices. These audio signals are then combined and routed to the rhythm preamp. Also, when Pin 6 goes low, the positive voltage is removed from the base of the Snare Noise Pulse Detector Q184, turning it off. When Q184 turns off, its collector goes high and applies positive voltage to the base of Q186, Snare Noise Keyer, turning it on. This causes positive voltage to turn on Diode D277 which allows noise signal to pass to the Snare Noise Voicing Amp Q187, where it is voiced and amplified for proper tonality. The voiced noise signal at the output of Q187 passes through the Snare Noise Adjustment VR26 and combines with the Hi and Lo Drum signals, together creating the Snare Drum voice. This signal is then applied to the Rhythm Preamp Q199. Turning on the Snare Cancel pushbutton applies a positive voltage to the base of Q184 turning it on, disabling Keyer Q186 and cancelling the Snare Drum.
Note: The ROM outputs are normally high (or positive).

BRUSH KEYING
(See Brush Length Control)

Q195, Q196 BRUSH ONE-SHOT MULTIVIBRATOR

When Pin 21 of the ROM IC45 goes low, the base voltage on Q196 is lowered, turning it off. When Q196 turns off, it applies a positive voltage pulse to two places: 1) To the base of Q195. This turns on Q195 which momentarily keeps the base voltage off Q196 holding Q196 on and 2) To the base of the Brush Noise Keyer Q197.

Q197 BRUSH NOISE KEYER

A positive voltage pulse is applied to the base of the Brush Noise Keyer Q197 each time the brush one-shot multivibrator conducts. This positive voltage turns Q197 on which applies a positive voltage to Diode D283 turning it on. This allows noise signal to pass to the brush voicing amp. The voltage from Q197 also charges the 8 uf capacitor at its emitter and when Q197 turns off, this capacitor discharges holding D282 on for the duration of its discharge. The length of discharge time is determined by variations on the Brush Length Control Line.

Q198 BRUSH VOICING AMP

Noise signal is applied to Q198 through Diode D283. Here the signal is voiced and amplified for proper Brush tonality. The signal then passes through the Brush Adjustment VR28 and is applied to the Rhythm Preamp Q199.

CYMBAL KEYING
(See Cymbal Length Control)

Q191, Q192 CYMBAL ONE-SHOT MULTIVIBRATOR

When Pin 7 of ROM IC45 goes low, the base voltage on Q192 is lowered, turning it off. When Q192 turns off, it applies a positive voltage pulse to two places: 1) To the base of Q191. This turns on Q191 which momentarily keeps the base voltage off Q192, holding Q192 on and 2) To the base of the Cymbal Noise Keyer Q193.

CIRCUIT DESCRIPTION

Q193 CYMBAL NOISE KEYER
A positive voltage pulse is applied to the base of the Cymbal Noise Keyer Q193 each time the Cymbal one-shot multivibrator conducts. This positive voltage turns Q193 on which applies a positive voltage to Diode D282 turning it on. This allows noise signal to pass to the Cymbal Noise Voicing Amp. The voltage from Q193 also charges the 8 uf capacitor at its emitter and when Q193 turns off, this capacitor discharges holding D282 on for the duration of its discharge. The length of discharge time is determined by variations on the Cymbal Length Control Line.

Q194 CYMBAL VOICING AMP
Noise signal is applied to Q194 through Diode D282. Here the signal is voiced and amplified for proper Cymbal tonality. The signal then passes through the Cymbal Adjustment VR27 and is applied to the Rhythm Preamp Q199.

Q199 RHYTHM PREAMP
The rhythm preamp amplifies all audio signal from the instrumentation circuits. These signals are then applied through the Rhythm Volume Control VR30 to the rhythm output amp.

SCHEMATIC 10

REVERB, VOLUME REGULATORS & AMPLIFIERS

Audio signal from the Flute Mixing and Main Mixing Preamps, Pedal Filter, Rhythm Output and Phase 2 and 3 output amps is channelled two ways simultaneously: through the reverb circuitry and their respective volume regulators. The reverb output is then routed to the Main and Leslie volume regulators.

IC33C REVERB DRIVER
Audio output signal from the Flute and Main Mixing Preamps, Pedal Filter Rhythm and Phase 2 and 3 Output Amps is applied to IC33C where it is amplified and connected to the Reverb Spring unit producing the reverb effect.

Q123, Q124, Q125 REVERB RECOVERY AMPS
Reverberating audio signal from the Reverb Spring unit is applied to Q123, Q124 and Q125. The signal is amplified and transformed to a low impedance signal, before being routed to the Main and Leslie Volume Regulators via the Reverb Length Control VR19.

Q126 VOLUME REGULATOR DRIVER
The amplitude of the signal at the output of the volume regulators is controlled by the Volume Regulator Driver Q126. Pressing the expression shoe down moves the lamp in Expression Pedal Photocell P2 closer to the photocell, decreasing the photocell's resistance, which increases the voltage on the base of Q126. This in turn increases the emitter voltage of Q126. Applying this voltage to Pin 5 of the volume regulators increases the amplitude of their output signal.

IC39, Q127 MAIN VOLUME REGULATOR & OUTPUT AMP
Audio signal from the Main Mixing Preamps, Bass Filter, Rhythm Output Amp and Reverb is applied to IC39 where the amplitude of the Main output signal is regulated. Some signal from the Bass Filter bypasses IC39 allowing some Bass signal to pass to the Main Output Amp Q127 when the organ is at minimum volume. The output of IC39 is applied to Q127 where it is amplified before being routed to the Main power amplifier.

IC40, Q128 LESLIE VOLUME REGULATOR & OUTPUT AMP
Audio signal from the Flute Mixing Preamps, Bass Filter, Rhythm Output Amp and Reverb is applied to IC40 where the amplitude of the Leslie output signal is regulated. The output of IC40 is applied to the Leslie Output Amp Q128. Here the signal is amplified before being routed to the Leslie power amplifier.

Q129-Q136 MAIN, LESLIE, PHASE 2 CHORUS & PHASE 3 CHORUS AMPS
These four amplifiers are identical. They are direct coupled with a quasi-complimentary output configuration. The power output is rated at 25 watts RMS for each amplifier. The function of the preamp is to boost the signal voltages to a point where they can be used by the driver and pre-driver circuits. Preamp Q130 senses the signal at the output of the amplifier and controls it by regulating the signal input at the preamp. The pre-driver inverts the audio voltages so that the drivers work in push-pull. The output transistors convert the audio voltages from the drivers into high current, low voltage output signal that is connected via the speaker enable relay contacts to the speakers.

SCHEMATIC 12

POWER SUPPLY

AC line voltage is converted into positive and negative DC supply voltages using Transformer T1 and Rectifier Bridge D180. Zener Diodes Z1-Z4, Regulator IC38 and Regulator Transistors Q121 and Q122 are used as voltage regulators on several voltage lines. Some of the voltage divider circuits are located on various boards throughout the organ. They are enclosed in Dotted Lines with a note for their location. A 3.2 amp Slo-Blo fuse is employed in the primary circuit of the Power Supply to prevent component damage which may be caused by a short circuit.

SCHEMATIC 13

CHORD FUNCTION GENERATOR (CFG)

CHORD FUNCTION GENERATOR IC49

The Chord Function Generator IC49 contains a keyboard scanning system, five programmable frequency generators and the required logic to provide four output features which are bass, chord, strum and arpeggio. The keyboard scanning system is capable of scanning 72 time points on a sequential basis. The scan matrix is partitioned in a 12 (X scan) by 6 (Y scan) array. Sequential pulses are outputted on the 12 X lines and a particular time point is active when one of the X lines is connected to one of the Y lines. In the non-chord mode (Magic Genie Chord tab off) the bass feature is the only function that is enabled. In this mode of operation bass signal is outputted from Pins 6 & 7 of the CFG. In the chord mode (Magic Genie Chord tab on) circuitry is enabled to add data bits. These bits correspond to the notes in the chord being played. For example, if a chord is being played there will be data bits at 3 of the 72 time points. If the A2 Key (which is the 7th switch) is pressed, a fourth data bit is added to the chord; pressing the minor footswitch shifts the data at one of the time points creating the minor of the chord being played. The minor and 7th of the chord reset with each new keydown. The other features of the chip, strum and arpeggio, can also be enabled when the chip is in the chord mode. All the features are outputted when a key is pressed. If the chord hold tab is turned on, the features latch and will continue to play after the key is released. Turning on a rhythm disconnects Pin 21 of the CFG from Pin 31 of the CFG. This sets up the CFG to accept rhythm pulses for triggering the Boogie Woogie Bass sequence.

Note: The Arpeggio, 7th, Minor, Chord Hold, Magic Chord and Any Rhythm On features of the CFG are inverse functions. This means that the time points for these functions are active when the feature is not playing. To enable these functions to operate, the X and Y lines associated with them must be disconnected.

Q220 CHORD FUNCTION MASTER OSCILLATOR

Q220 develops a continual high frequency signal of (approximately 500KHz) that is applied to Pin 3 of IC57B & IC61B. With the D input and Q bar output of IC57B tied together, it becomes a divide-by-two divider. It also acts as a buffer stage between the Master Oscillator and the CFG. The divided-by-two clock frequency from IC57B is applied to five programmable frequency generators via Pin 24 of the CFG IC49. The programmable generators are each capable of generating one of 12 frequencies, dependent on the address code provided them. These generators supply the audio signal for the bass in both the chord and non-chord mode of the CFG. The generators also supply the audio signal for the Magic Chords, Strum and Arpeggio features in the chord mode of the CFG. The divided clock frequency from IC57B is also applied to IC59A & B where it is divided-by-two twice and routed to the clock input of the Magic Genie AOC and 4-foot Decoder IC60. The signal output from Q220 that is applied to IC61B is divided by three by IC61A & B with an output of approximately 166KHz at Pin 9 of IC61A. This signal is applied to Pin 2 of IC62 and IC63 where it is divided and used for the 4-foot Magic Chord signal.

MAGIC GENIE CHORDS

There are 28 Lower Keyboard bass keyswitches. The first 12 of these are also Magic Chord keyswitches. Turning on the Magic Chord tabswitch performs the following functions: 1) The base of 7th Enabler Q210 is ungrounded allowing positive voltage to reach its base; 2) Positive voltage is routed through Diode D327 to the base of B.W. Bass Enable Q213 when the B.W. Bass tab is on; 3) Positive voltage is applied to the base of Q215 Accompaniment Killer and Serial Data Enable. This turns on Q215 and disables the A1-A2 DC keyswitch by grounding out the keying voltage through Diodes D96-D108. When Q215 turns on, it also causes Q221 Serial Data Switcher to turn off, allowing the Serial Data from Pin 23 of the CFG to pass to Magic Genie AOC & 4-foot Decoder IC60, and 4) Positive voltage is applied to Pin 8 of IC50A and IC51D. With Pin 8 of IC50A A2 Scan Disable held high, its output Pin 10 is held high. This blocks the negative transition of the X line at Pin 33 of IC49 from the Y line of Pin 21 when the A2 bass keyswitch is pressed. This prevents the A2 bass information from entering the Serial Data when the A2 DC keyswitch (see Drawing 4) is used to add the 7th to the Magic Chord being played. (Since the Serial Data information is used to trigger the AOC in the chord mode, the A2 bass information would key an incorrect upper keyboard note when adding the 7th.) The positive voltage applied to Pin 8 of IC51D Magic Chord Enable locks its output Pin 10 high. This blocks the negative transition of the X line at Pin 29 from the Y line of Pin 21 and puts the CFG in the chord mode of operation. Pressing a Magic Chord keyswitch (A1-G#1) at this time causes data bits to appear at three CFG time points. These data bits provide the address code for the programmable frequency generators, causing three audio frequencies that form a specific chord to be outputted at Pin 5 of the CFG. These audio signals are then applied to the Magic Chord Preamp Q229 where they are amplified and routed to the Lower Keyboard Flute and Genie Modulator circuits. Magic Chord Squelcher Q231 has positive voltage applied to its base from the Magic Genie AOC Decoder each time a Lower Keyboard key is pressed, turning on Q231 which turns off Q230 and ungrounds the Magic Chord output. With no lower keys held, Q230 grounds the Magic Chord output preventing any leakage that might occur.

Note: In the Magic Chord Mode of Operation, only the highest chord being played will sound.

MAGIC GENIE 4-FOOT TOS

Audio signal from the Chord Function Master Oscillator is divided by three by IC61A & B producing a signal of approximately 166KHz at Pin 9 of IC61A. This signal is applied to Pin 2 of IC62 & IC63 where it is divided simultaneously producing twelve specific audio frequencies. These frequencies are used for the Lower Keyboard 4-foot voices when the CFG is in the chord mode of operation. Serial data information corresponding to the Magic Chord being held is clocked into Magic Genie AOC and 4-foot Decoder IC60. At the end of the CFG scan (72 time points) a positive sync pulse occurs at Pin 22 of the CFG. This pulse is transferred through IC58A & B to Pin 37 of IC60. Applying this pulse to Pin 37 transfers the chord information out of IC60 with results in a positive voltage at the anodes of three diodes D361. The diodes are turned on, allowing three audio signals that form a specific chord to pass to the Lower Keyboard 4-foot filtering circuits.

CHORD HOLD ENABLE

With the Chord Hold tab off, Pin 12 of IC51C is held low. This causes the output of IC51C at Pin 11 to follow the X line from Pin 28 of the CFG. This in effect connects the X Scan Line at Pin 28 to the Y Scan Line at Pin 21 and is the condition of the CFG chip when the Chord Hold feature is not operating. Turning on the Chord Hold tabswitch locks the output of IC51C high, disconnecting the X and Y Scan Line which puts the CFG in the Chord Hold Mode. In this mode of operation, all Magic Genie functions will continue to be outputted after all Lower Keyboard keys are released.

7TH ENABLE

With the Magic Chord tab on, positive voltage from Q211 is applied to the base of Q210 turning it on. This connects the X output on Pin 26 of the CFG to the Y line at Pin 21 and activates the 7th time point of the CFG. This is the condition of the CFG when the 7th of the chord is not being played. To enable the 7th to play the above, X and Y lines must be momentarily disconnected. This is accomplished by the following: Pressing the A2 keyswitch applies a positive voltage to the base of Q211, turning it on which removes positive voltage from the base of Q210 and turns it off. When Q210 turns off the X and Y lines are disconnected, deactivating the 7th time point which adds the 7th component to the Magic Chord being played.

MINOR ENABLE

When the minor of the chord is not being played, Minor Enable Q212 is held on which holds Pin 2 of IC51B low. With Pin 2 of IC51B held low, its output at Pin 3 will follow the X line from Pin 27 of the CFG. This in effect connects the X line at Pin 27 to the Y line at Pin 21 and is the condition of the CFG when the minor is not being played. To enable the minor to play the above X and Y lines must be momentarily disconnected. This is accomplished by the following: activating the minor switch (located to the right on the expression shoe) lowers the voltage on the base of Q212 turning it off. This causes Pin 2 of IC51B to go high, which in turn locks its output Pin 3 high. With Pin 3 held high, the negative transition of the X line at Pin 27 of the CFG is not passed to the Y line at Pin 21. This deactivates the CFG time point for the minor, changing the Magic Genie chord being played to a Minor chord.

STRUM

STRUM ENABLE

Holding a chord keyswitch with the Magic Chord tabswitch on, outputs the frequencies of the chord being played on the four strum signal lines Pins 1, 2, 3 & 40. If the Ukulele tab is on, the X line at Pin 32 of the CFG is connected through the Ukulele Strum Enable Gate IC50D to the Y line at Pin 21 and the frequencies outputted on the signal lines will be one octave higher. Each time a pulse occurs at Pin 15 of the CFG from the Strum Trigger Q226, a sequence of keyer pulses are generated and outputted on the four Strum Keying Lines, Pins 8, 9, 10 & 11. The frequency of this sequence of keyer pulses is determined by the RC network on Pin 14 of the CFG. The first keyer pulse appears on the Root Keying Line, then the 3rd, 5th and 7th. If the 7th of the chord is not enabled (see 7th Enable), the sequence will not include a pulse on Pin 8 for the Strum 7th signal. The pulses on the four keying lines are applied to the anodes of Diodes D344, D347, D350 & D353 turning them on, allowing audio signal on the four strum signal lines to pass to the Strum Preamp Q227. Here the signal is amplified and routed via either the Guitar or Ukulele Strum tabs to various voicing circuits.

STRUM TRIGGER

Turning on the Swing, Dixie, Shuffle, Swing Waltz, Waltz or Swing March rhythm switch applies a positive voltage to the base of Q223, turning it on. This lowers the voltage on the base of Q224 which turns off. When Q224 turns off it applies a positive voltage to Pin 1 of Strum Trigger Gate IC54B. With Pin 1 of IC54B held high, it acts as an inverter and its output at Pin 3 will be the inverted input applied to Pin 2. The input at Pin 2 can come from the ROM IC45 Pin 22 or Pin 23 or from the Boogie Bass Trigger gates, depending on the position of the Strum/Upbeat/Downbeat tab and the Boogie Bass tab. The output of IC54C can be considered high, so when Pin 3 of IC54B goes high a negative pulse results at Pin 8 of IC54D, momentarily lowering the voltage on the base of Q226 turning it off. When Q226 turns off, its collector applies a positive pulse to Pin 15 of the CFG IC49 triggering the strum sequence. For the above-mentioned rhythms, the strum sequence will occur with the Accompaniment pulse when the Strum tab in the Upbeat position, and with the bass pulse in the Downbeat position (Boogie or High/Low Bass, depending on the position of the Boogie Bass tab). Using any rhythm except the above-mentioned causes the following: Q223 is off, which applies a positive voltage to the base of Q224. This turns Q224 on, holding Pin 1 of IC54B in a low state. With Pin 1 of IC54B held low, its input at Pin 2 has no effect and its output at Pin 3 is locked high. The high output from Pin 3 is applied to Pin 4 & 10 of IC54 causing these gates to act as inverters. The trigger pulse at the output of IC54D will follow the negative transition of the counter output from Pin 12. Putting the Strum tab in the downbeat position inverts the output from Pin 12 through IC54A. The trigger output at Pin 8 of IC54D will now follow the positive transition of the counter output from Pin 12. For the specific time point where the strum sequence occurs for each rhythm, see the Rhythm Patterns Diagram in the Chart Section of this manual.

ARPEGGIO

ARPEGGIO ENABLE

Turning on the Piano or Harpsichord Arpeggio tab applies a positive voltage to Pin 6 of IC51A Arpeggio Enable, locking its output at Pin 4 high. This blocks the X line at Pin 25 of the CFG from the Y line at Pin 21 and enables the internal CFG Arpeggio Shift Register. Pulses are applied to the shift register from one side of the internal Arpeggio Clock Oscillator. The shift register advances with every other transition of the clock and generates a keying pulse which appears on Pin 13 of the CFG. The clock is triggered from the Arpeggio triggers through Pin 12 of the CFG. The shift register also addresses a multiplexer which has as its input 3 octaves of root, 3rd & 5th frequencies of the Magic Chord being played. The output of the multiplexer passes through some gating and appears on the arpeggio signal line, Pin 39 of the CFG. A different frequency is outputted on Pin 39 each time the shift register advances. When the keyer pulse is present on Pin 13, D96 is turned on allowing the audio signal on Pin 39 to pass to the Arpeggio Preamp Q228. Here the signal is amplified and routed through the Piano or Harpsichord tab to the Piano filter or Harpsichord Preamp.

ARPEGGIO TRIGGER

Turning on the Swing, Dixie, Shuffle, Swing Waltz, Waltz or Swing March rhythm switch applies a positive voltage to the base of Gate Selector Q223, turning on Q223 which in turn switches Q224 off. With Q223 on, Pin 12 of IC53B is held low, disabling this gate. With Q224 off, Pin 8 of IC53A is held high, causing this gate to act as an inverter. The input at Pin 9 of IC53A is the delayed strobe pulse. When the positive strobe pulse occurs, Pin 10 of IC53A goes low applying an arpeggio trigger pulse to Pin 12 of the CFG. If a rhythm is being used that is not mentioned above, IC53A will be disabled and IC-53B will act as an inverter due to the condition of Q223 & Q224 and the off condition of the above-mentioned rhythms. The input on Pin 13 of IC53B is the delayed strobe pulse which has been frequency divided-by-two through Gate IC52A. When the strobe pulse occurs, Pin 11 of IC53B goes low applying an arpeggio trigger pulse to Pin 12 of the CFG. Because of the nature of the Arpeggio Clock (see Arpeggio Enable), the frequency of the keyer pulse at Pin 13 of the CFG will be half that of the frequency of the trigger pulse applied to Pin 12.

HIGH/LOW BASS

With the Magic Genie Chord tabswitch off, the only feature of the CFG chip that is outputted is the High/Low Bass. In this mode of operation, holding down two or more lower keyboard keyswitches (A1-C3) causes the following: Audio signal corresponding to the highest note being played is outputted from Pin 6 of the CFG and audio signal corresponding to the lowest note being played is outputted from Pin 7 of the CFG. These signals are routed through High/Low bass select circuits to the base of Q84 Divider Driver (see Schematic 7). With no rhythm on, positive voltage from the Rhythm Start tabs is applied to the select circuits allowing only low bass signal to pass to Q84.

ROOT/FIFTH BASS

With the Magic Genie Chord tabswitch on, the bass feature of the chip is in the Root/Fifth mode of operation. If a Magic Genie Chrod (one-note chord) is held at this time, the audio signals at the bass root output (Pin 7) and bass 5th output (Pin 6) are the root and 5th components of the chord being played. These signals are routed through High/Low bass select circuits to the base of Q84 Divider Driver (see Schematic 7). With no rhythm on, positive voltage from the rhythm start tabs is applied to the select circuits allowing only the root bass signal to pass to Q84.

BOOGIE WOOGIE BASS

BOOGIE WOOGIE BASS ENABLE

Turning on the Boogie Woogie Bass tab with the Magic Chord tab on, allows positive voltage to pass through Diode D328 to the Low Bass Selectors Q82 & Q83 and also through Diode D327 to the base of Q213. The voltage applied to the bass selectors holds the signal path for the Low Bass signal on. (In the Boogie Woogie Bass mode, audio signal is only outputted from Pin 7 of the CFG.) The voltage applied to the base of Q213 turns Q213 on. This holds Pin 6 of IC50B low and also resets the Boogie Woogie Bass shift register through Pin 6 of the CFG. With Pin 6 of IC50B held low, its output at Pin 4 follows the X Scan Line from Pin 30 of the CFG. This puts the CFG bass feature in the Boogie Woogie mode.

Under the above conditions with a rhythm on (see Any Rhythm on Gate IC50C), 5 signals are multiplexed to the bass Lo/Root output, Pin 7 of the CFG. The multiplexer is controlled by a shift register. Each time a trigger pulse is applied to Pin 37 of the CFG from the Boogie Bass Triggers, the shift register advances one position and outputs the next signal in the bass sequence. The signal is outputted at Pin 7 of the CFG, then routed through the Low Bass Selectors to the base of Divider Driver Q84. If a keydown occurs before the bass sequence is complete, the shift register will reset to the starting point.

BOOGIE WOOGIE BASS TRIGGER

Turning on the Swing, Dixie, Shuffle, Swing Waltz, Waltz or Swing March rhythm switch applies a positive voltage to the base of Gate Selector Q223. This causes Q223 to turn on which in turn causes Q224 to turn off. With Q223 on, Pin 5 of IC53D is held low, disabling this gate. With Q224 on Pin 1 of IC-53C is held high causing this gate to act as an inverter. The input at Pin 2 of IC53C originates at Pin 11 of IC55A. The output from the clock multivibrator is applied to Pin 11 of IC55A where it is frequency divided-by-two. The divided-by-two output is applied as input to IC55B. IC55B, IC56A & IC56B comprise a divide-by-three divider with the output at Pin 5 of IC56B. The output from Pin 5 is applied to Pin 2 of IC52B, the input at Pin 1 of IC52B is the strobe pulse. This causes the output at Pin 3 of IC-52B to have a pulse width equal to the strobe pulse and a frequency which is the Counter input frequency (Pin 7 IC44) divided-by-three. When Pin 3 of IC52B goes high, a negative pulse results at the output Pin 3 of IC53C (since IC53C acts as an inverter) lowering the voltage on the base of Q218 and turning it off. This applies a positive Boogie Woogie advance pulse to Pin 37 of the CFG. Q217 holds Q218 off momentarily which increases the pulse width of the trigger pulse. At the end of the rhythm measure a negative reset pulse is applied to the Boogie Bass Pulse Dividers, setting the output Pin 5 of IC56B high.

If any but the above rhythms are on Gate IC53C will be disabled and IC53D will act as an inverter due to the state of Q223 & Q224 and the off condition of the above-mentioned rhythms. The input at Pin 6 of IC53D originates at Pins 12 & 13 of IC52D. The input at Pin 12 of IC52D is the counter input frequency (Pin 7 of IC44) divided-by-two and the input at Pin 13 is the counter input frequency divided-by-four. This causes the output at Pin 11 to be the frequency of the Pin 13 input, having a pulse width equal to the Pin 12 input. This output is then applied to Pin 9 of Gate IC52C, the input at Pin 9 of IC52C is the strobe pulse, the output at Pin 10 will be the strobe pulse at the divided-by-four counter input frequency. When Pin 10 of IC52C goes high, a negative pulse results at the output Pin 4 of IC53D (since IC53D acts as an inverter). This pulse is applied to the base of Q218 which operates as described above.

Q216 RHYTHM & INTRO ON SWITCHER

With no rhythms on, positive voltage from the anode of D191 (see Drawing 11) is applied to the base of Q216 holding it on. Switching on a rhythm lowers the voltage on the base of Q216 through Rhythm Start Transistor Q54. This causes Q216 to turn off applying a positive voltage to the Any-Rhythm-On Gate IC50C, the Rhythm on Vibrato Killer Q219 and the Strum Trigger Disable Q225. Pressing the Intro Tabswitch applies a positive voltage to the base of Q216 from the Intro Latch Q163. This turns Q216 on which removes positive voltage from the above circuits and also applies a reset pulse to Pin 13 of IC57A Boogie Intro Reset.

Note: The positive voltage from Intro Latch Q163 is also applied through Diodes D337 & D338 to the bases of Gate Selectors Q223 & Q224. This turns them on and disables the Arpeggio and Boogie Bass Trigger Gates during the Intro Set.

IC50C ANY-RHYTHM-ON GATE

With no rhythm on, Pin 2 of IC50C is held low by the on condition of Q216. This allows the X Scan output from Pin 31 of the CFG to pass to the Y Scan Line at Pin 21. Under this condition the internal Boogie Woogie Bass multiplexer is locked in the root position and outputs the Lo/Root note from Pin 7 of the CFG. With a rhythm on, the collector of Q216 goes high disabling IC50C blocking the X Scan output from the Y Scan. T is tells the multiplexer a rhythm has been switched on allowing it to advance with each Boogie Bass Trigger pulse applied to Pin 37.

Q219 RHYTHM ON VIBRATO KILLER

With a rhythm on the collector of Q216 Rhythm & Intro on switcher goes positive. This positive voltage is applied to the base of Q219 turning it on. When Q219 turns on it grounds the output from the vibrator oscillator preventing it from reaching the Chord Function Master Oscillator Q220. This cancels the vibrato effect on the Magic Genie features when a rhythm is on.

Q225 STRUM TRIGGER DISABLE

Pressing the Intro tab turns on Q216 Rhythm and Intro on Switcher, which removes positive voltage from the base of Q225 turning it off. When Q225 turns off, it removes the voltage at the collector of the Strum Trigger Q226 disabling Q226, and cancelling Strum for the duration of the Intro Set.

IC57A BOOGIE INTRO RESET

After the Intro Set there is a one clock pulse delay before the rhythm restarts. The Boogie Intro Reset blocks this pulse from triggering the Boogie Bass Trigger so the rhythm and bass sequence start together on the second clock pulse after Intro. This is accomplished by the following: Pushing the Intro tab turns on Q216. This puts a low on Pin 13 of IC-57A which locks the output Pin 8 of IC57A high. When the first clock pulse occurs after Intro, the output of the Boogie Trigger Gates will go low but the Boogie Bass Trigger Q218 does not feel this negative transition because Pin 8 of IC57A is still held in a high state. When the output of the Boogie Bass Trigger Gate is making a positive transition IC57A clocks and the Q output from Pin 8 locks in a low state. On the next clock pulse the Boogie Bass Trigger Gate goes low and is now able to turn on Q218 and trigger the Bass Advance input of the CFG.

MAGIC GENIE AOC

With the Magic Chord tab on, holding down a chord keyswitch outputs information on the Serial Data stream (Pin 23 of the CFG) which corresponds to the chord being played. Under these conditions, Serial Data Switcher Q221 is turned off through Serial Data Enable Q215, and the Serial Data information passes through Inverter Q222 to the input Pin 3 of the Magic Genie AOC Decoder IC60. The output Pin 6 of IC57B (approximately 250KHz) is applied to IC59A & B where it is frequency divided by four and routed to the Clock Input Pin 2 of IC60. The Serial Data Information is transferred into IC60 with each clock pulse at Pin 2. At time point 72 at the end of the CFG Scan a sync pulse occurs at Pin 22 of the CFG. The sync pulse clocks Pin 3 of IC58A causing the Q output to go high, holding the D input of IC58B high. When the next clock pulse occurs at Pin 11 of IC58B the Q output at Pin 8 will go low resetting dividers IC59A & B and transferring the AOC information out of IC60. If for instance a C Magic Chord was being held this would result in a positive voltage on the C, E & G lines or Pins 14, 18 & 21 of IC60. This positive voltage is then routed to the AOC drivers. From this point, the AOC operates as described under the Schematic 8 heading.

CIRCUIT DESCRIPTION

SCHEMATIC 14

CHORUS MODULATOR PHASE 1, 2 AND 3

All 3 channels, Phase 1, 2 and 3, of the Chorus Modulator are identical in operation. For discussion purposes the schematic references for Phase 1 are used in the description below.

Q248, Q249 CLOCK 1 AND PULSE SHAPER

Clock 1 Q249 oscillates at a frequency of 19Hz. The output from Clock 1 is applied to the Pulse Shaper Q248 where it is amplified and applied to the input of the high frequency Divide-by-3 network. Here the waveform is divided and appears as three outputs with a 120 degree phase shift between Pins 6 and 4, 4 and 2 and 2 and 6.

Q240, Q241 CLOCK 2 AND PULSE SHAPER

Clock 2 Q240 oscillates at a frequency of 1.9Hz. The output from Clock 2 is applied to the Pulse Shaper Q241 where it is amplified and applied to the input of the low frequency Divide-by-3 network. Here the waveform is divided and appears as three outputs with a 120 degree phase shift between Pins 6 and 4, 4 and 2, and 2 and 6.

Q250, Q251, Q258, Q259, Q266 AND Q267 PHASE 1, 2 AND 3 FILTERS

The similar outputs from the high and low frequency divide-by-3 networks are combined and applied to a low pass filter tuned to approximately 1 Hz. (Q250, Q251, etc.) The output from the filter is a low frequency, irregular sine wave which is used as the drive signal for the voltage-controlled oscillator.

IC67, IC69 AND IC71 VOLTAGE-CONTROLLED OSCILLATOR

The output of the voltage controlled oscillator is a triangle waveform 2 volts peak-to-peak with an average DC level of 5 volts. The frequency of this waveform is dependent on the amplitude of the drive signal from the filters. Since the drive signal is an irregular waveform, the output frequency of the oscillator is constantly varying. The output from the oscillator is then applied to the phase splitters.

Q252-Q254, Q260-Q262, Q268-Q270 PHASE 1, 2 AND 3 PHASE SPLITTERS

The collector and emitter outputs of Q252 follow the output from the voltage controlled oscillator (the collector output being inverted). When the collector of Q252 is high, Q253 turns on applying a negative pulse to Pin 4 of IC68. When the emitter of Q252 goes high, Q254 turns on applying a negative pulse to Pin 1 of IC68.

IC35A, Q238 and Q239 CHORUS MIXING PREAMP AND INPUT PREAMPS

Audio signal from string and flute circuits is combined by the Chorus Mixing Preamp IC35A and applied to the input preamps. The input preamps amplify this signal which is then routed to the inputs of the Phase 1, 2 and 3 Bucket Brigades.

IC64, IC70 AND IC72 BUCKET BRIGADE

The Bucket Brigades are analog shift registers which sample the input audio signal at the rate of the Clock pulses from the Phase Splitters. Each time a negative clock pulse is applied to Pin 1 and then Pin 4 of IC68, the audio signal is transferred to the next stage of the Bucket Brigade until it appears as output at Pin 5. This causes a delay between the input and output signal. Since the frequency of the clock pulses are constantly varying, the delay time of the signal through the Bucket Brigade also varies, phase modulating the audio. The delay time of Phase 1, 2 and 3 are constantly varying but will never be the same at any one time. The audio signal output from the Bucket Brigade is then applied to the low pass filters.

Q255 & Q256, Q263 & Q264, Q271 & Q272 LOW PASS FILTERS

The low pass filters filter out the high frequency clock component that is contained in the audio signal. The outputs of the Phase 1, 2 and 3 Low Pass Filters are then cross-coupled for amplitude variation before being applied to the output amps.

Q257, Q265 AND Q273 PHASE 1, 2 AND 3 OUTPUT AMPS

The audio signal from the low pass filters is applied to the output amps where it is amplified and routed to the Main, Phase 2 and Phase 3 Power Amplifiers.

ADJUSTMENTS

VR2 VIBRATO SPEED ADJUSTMENT

Vibrato speed may be adjusted by using a small screwdriver. Proper speed is between 6-7 Hz. The Vibrato Oscillator will not oscillate if adjustment is extreme.

L1 TUNING COIL

This adjustment is carefully set at the factory. Should tuning be necessary, it is suggested a tuning fork for a certain note be used (C for example). By holding down a key (C for example), adjust the tuning coil with a non-metalic screwdriver until no roll or beat is heard between the organ note and fork tone. When this note is properly tuned, the TOS tuning is automatically locked in.

VR5 WOW REST ADJUSTMENT

This adjustment should be set for 1.2 volts at the cathode of D25. Too extreme an adjustment will result in the loss of the Wow effect.

VR11 GENIE THUMP ADJUSTMENT

The Genie length is factory-set by component values. The purpose of the Genie Thump Adjustment is to eliminate any DC transient (thump) that may occur when playing the Genie Accompaniment voices. To adjust, turn on any rhythm and a Genie accompaniment tabswitch (Piano, Guitar, Banjo) set rhythm volume at minimum and expression shoe at maximum. Turn adjustment until minimum thump is heard. If thump level cannot be reduced satisfactorily by adjustment, then replace Genie Modulator IC.

VR15 PERCUSSION THUMP ADJUSTMENT

The Percussion length is factory-set by component values. The purpose of the Percussion Thump Adjustment is to eliminate any DC transient (thump) that may occur when playing the upper keyboard percussion voices. To adjust, set expression shoe on maximum. Turn on an upper keyboard percussion voice (Mandolin, Banjo). Turn adjustment until minimum thump is heard. If thump cannot be reduced satisfactorily by adjustment, then replace Modulator IC.

VR17 AOC RANGE ADJUSTMENT

This adjustment regulates the voltage supply to the AOC keyers, thereby adjusting the AOC range. Too extreme an adjustment will cause dissonant chords when playing AOC.

VR21 MINIMUM ORGAN ADJUSTMENT

Set this adjustment by turning only the Flute 8 tab on. Hold down a key with the expression shoe up and turn VR21 until the note being held can just be heard.

VR20 MAXIMUM ORGAN ADJUSTMENT

This adjustment is factory-set for maximum output at full expression shoe. Adjustment of VR20 effects only the maximum volume level of the organ and does not effect the minimum adjustment setting.

VR26 SNARE NOISE ADJUSTMENT
VR27 CYMBAL ADJUSTMENT
VR28 BRUSH ADJUSTMENT

The best setting of these adjustments is one where the instruments sound balanced when compared to the drums. Always set these adjustments with the balance control at midpoint. Proper Snare Drum noise is achieved when the High and Low Drum sounds blend with the Snare noise producing the most realistic Snare Drum.

L30 CHORD TUNING COIL

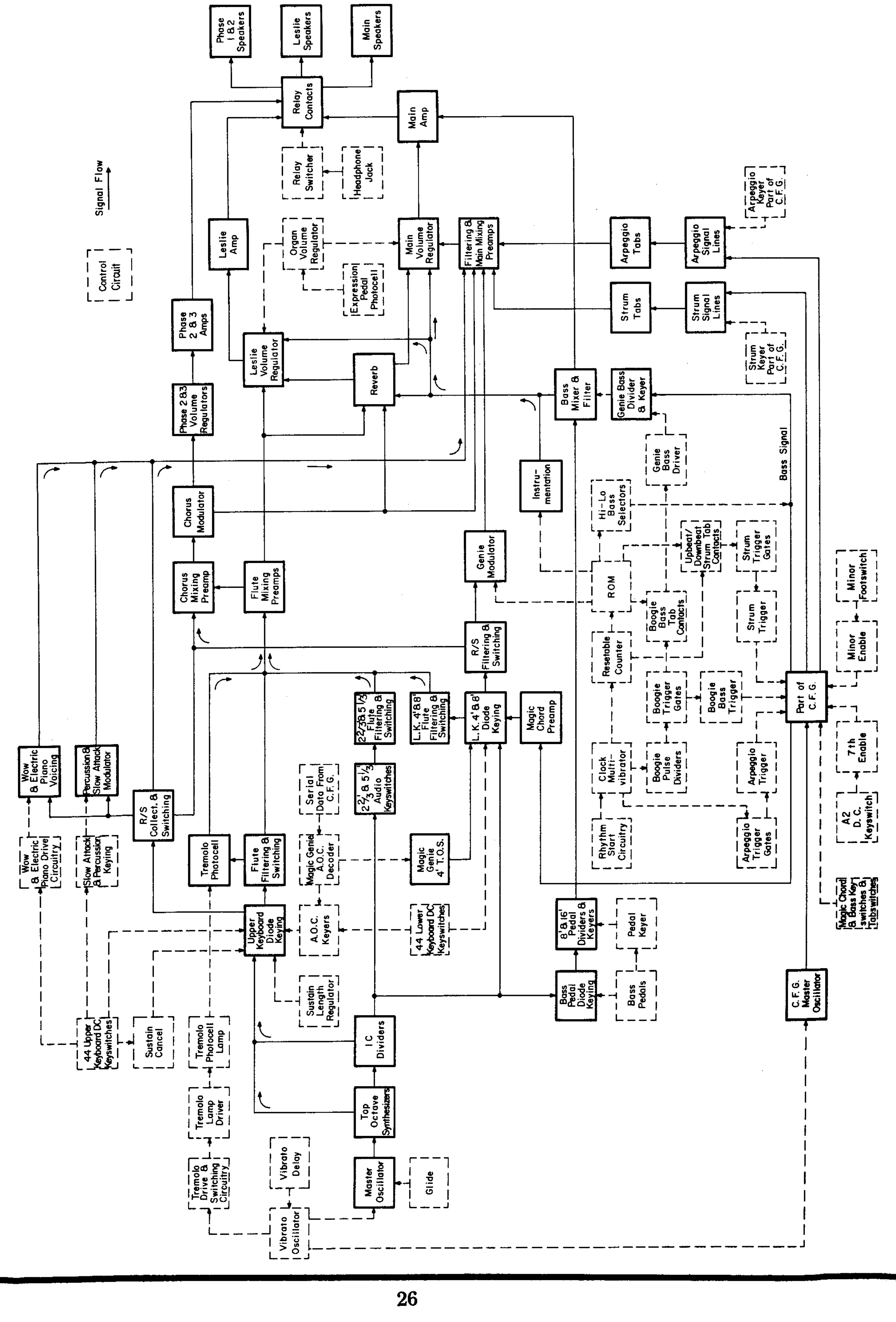
First, tune L1 as described above. Then turn off the Magic Chord tab and all Rhythm tabs. Turn on only the Lower Keyboard String Bass voice and Upper Keyboard Kinura voice. Now, holding a C on both the Upper and Lower Keyboards, adjust tuning coil L30 until no roll or beat is heard between the two notes.

NOTE: When tuning, always make sure all vibrato and vibrato pre-set voices are off.

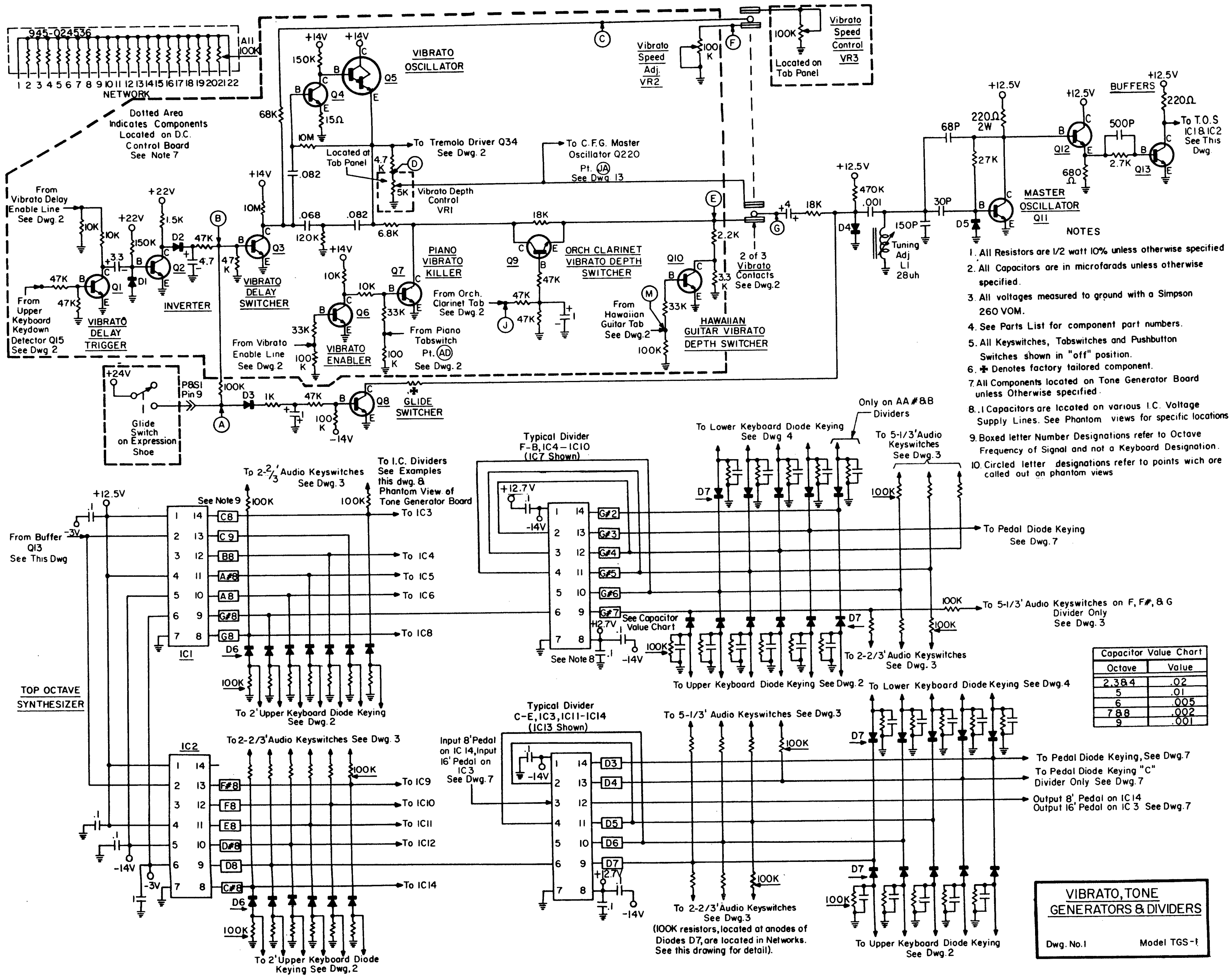
VR37 CHORD LEVEL ADJUSTMENT

With the Magic Chord tab off, hold a three-note left-hand chord; switch the Magic Chord tab on and hold the same chord, but as a Genie one-note chord. Adjust VR37 until the volume level of the chord is the same with the Magic Chord tab on or off.

BLOCK DIAGRAM


Phase 1 & 2 Speakers
Leslie Speakers
Main Speakers
Relay Contacts
Main Amp
Relay Switcher
Headphone Jack
Signal Flow
Arpeggio Keyer Part of C.F.G.
Control Circuit
Leslie Amp
Organ Volume Regulator
Main Volume Regulator
Filtering & Main Mixing Preamps
Arpeggio Tabs
Arpeggio Signal Lines
Expression Pedal Photocell
Strum Tabs
Strum Signal Lines
Phase 2 & 3 Amps
Leslie Volume Regulator
Reverb
Bass Mixer & Filter
Genie Bass Divider & Keyer
Strum Keyer Part of C.F.G.
Phase 2&3 Volume Regulators
Genie Bass Driver
Bass Signal
Instru-mentation
Hi-Lo Bass Selectors
Chorus Modulator
Genie Modulator
Upbeat/ Downbeat Strum Tab Contacts
Strum Trigger Gates
Minor Footswitch
Chorus Mixing Preamp
Flute Mixing Preamps
ROM
Boogie Bass Tab Contacts
Strum Trigger
Minor Enable
R/S Filtering & Switching
Resetable Counter
2 2/3 & 5 1/3 Flute Filtering & Switching
L.K. 4' & 8' Flute Filtering & Switching
L.K. 4' & 8' Diode Keying
Magic Chord Preamp
Boogie Trigger Gates
Boogie Bass Trigger
Part of C.F.G.
7th Enable
Wow & Electric Piano Voicing
Percussion & Slow Attack Modulator
R/S Collect. & Switching
Serial Data From C.F.G.
2 2/3 & 5 1/3 Audio Keyswitches
Clock Multi-vibrator
Boogie Pulse Dividers
Arpeggio Trigger
A2 D.C. Keyswitch
Wow & Electric Piano Drive Circuitry
Slow Attack & Percussion Keying
Tremolo Photocell
Flute Filtering & Switching
Magic Genie A.O.C. Decoder
Magic Genie 4' T.O.S.
Rhythm Start Circuitry
Arpeggio Trigger Gates
Magic Chord & Bass Keyswitches & Tabswitches
Upper Keyboard Diode Keying
A.O.C. Keyers
44 Lower Keyboard DC Keyswitches
8' & 16' Pedal Dividers & Keyers
Pedal Keyer
Sustain Length Regulator
Bass Pedal Diode Keying
Bass Pedals
C.F.G. Master Oscillator
44 Upper Keyboard DC Keyswitches
Sustain Cancel
Tremolo Photocell Lamp
IC Dividers
Tremolo Lamp Driver
Top Octave Synthesizers
Vibrato Delay
Tremolo Drive & Switching Circuitry
Master Oscillator
Glide
Vibrato Oscillator

SCHEMATIC 1


945-024536
All 100K
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
NETWORK
Dotted Area Indicates Components Located on D.C. Control Board See Note 7
From Vibrato Delay Enable Line See Dwg.2
From Upper Keyboard Keydown Detector Q15 See Dwg 2
VIBRATO DELAY TRIGGER
INVERTER
VIBRATO DELAY SWITCHER
VIBRATO OSCILLATOR
Q1
Q2
Q3
Q4
Q5
Q6
Q7
Q8
Q9
Q10
To Tremolo Driver Q34 See Dwg. 2
Located at Tab Panel
Vibrato Depth Control VR1
To C.F.G. Master Oscillator Q220 Pt. JA See Dwg 13
Vibrato Speed Adj. VR2
Vibrato Speed Control VR3
Located on Tab Panel
PIANO VIBRATO KILLER
From Orch. Clarinet Tab See Dwg 2
From Piano Tabswitch Pt. AD See Dwg. 2
VIBRATO ENABLER
From Vibrato Enable Line See Dwg 2
ORCH CLARINET VIBRATO DEPTH SWITCHER
From Hawaiian Guitar Tab See Dwg.2
HAWAIIAN GUITAR VIBRATO DEPTH SWITCHER
2 of 3 Vibrato Contacts See Dwg.2
Glide Switch on Expression Shoe
P8SI Pin 9
GLIDE SWITCHER
Tuning Adj L1 28uh
MASTER OSCILLATOR Q11
BUFFERS
Q12
Q13
To T.O.S IC1 & IC2 See This Dwg
A
B
C
D
E
F
G
J
M
From Buffer Q13 See This Dwg
TOP OCTAVE SYNTHESIZER
IC1
IC2
C8
C9
B8
A#8
A8
G#8
G8
F#8
F8
E8
D#8
D8
C#8
To IC3
To IC4
To IC5
To IC6
To IC8
To IC9
To IC10
To IC11
To IC12
To IC14
To I.C. Dividers See Examples this dwg. & Phantom View of Tone Generator Board
To 2-2/3' Audio Keyswitches See Dwg. 3
To 2' Upper Keyboard Diode Keying See Dwg.2
To 2' Upper Keyboard Diode Keying See Dwg.2
To 2-2/3' Audio Keyswitches See Dwg. 3
Typical Divider F-B, IC4-IC10 (IC7 Shown)
G#2
G#3
G#4
G#5
G#6
G#7
See Capacitor Value Chart
See Note 8
To Lower Keyboard Diode Keying See Dwg 4
Only on AA#&B Dividers
To 5-1/3' Audio Keyswitches See Dwg.3
To Pedal Diode Keying See Dwg.7
To 5-1/3' Audio Keyswitches on F, F#, & G Divider Only See Dwg. 3
To 2-2/3' Audio Keyswitches See Dwg. 3
To Upper Keyboard Diode Keying See Dwg.2
To Lower Keyboard Diode Keying See Dwg.4
Typical Divider C-E, IC3, IC11-IC14 (IC13 Shown)
Input 8' Pedal on IC 14, Input 16' Pedal on IC3 See Dwg.7
D3
D4
D5
D6
D7
To 5-1/3' Audio Keyswitches See Dwg.3
To 2-2/3' Audio Keyswitches See Dwg.3 (100K resistors, located at anodes of Diodes D7, are located in Networks. See this drawing for detail).
To Upper Keyboard Diode Keying See Dwg.2
To Pedal Diode Keying, See Dwg.7
To Pedal Diode Keying "C" Divider Only See Dwg.7
Output 8' Pedal on IC14 Output 16' Pedal on IC 3 See Dwg.7
+12.5V
+14V
+22V
+24V
-14V
-3V
+12.7V

NOTES

1. All Resistors are 1/2 watt 10% unless otherwise specified
2. All Capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Keyswitches, Tabswitches and Pushbutton Switches shown in "off" position.
6. ✙ Denotes factory tailored component.
7. All Components located on Tone Generator Board unless Otherwise specified.
8. .1 Capacitors are located on various I.C. Voltage Supply Lines. See Phantom views for specific locations
9. Boxed letter Number Designations refer to Octave Frequency of Signal and not a Keyboard Designation.
10. Circled letter designations refer to points wich are called out on phantom views

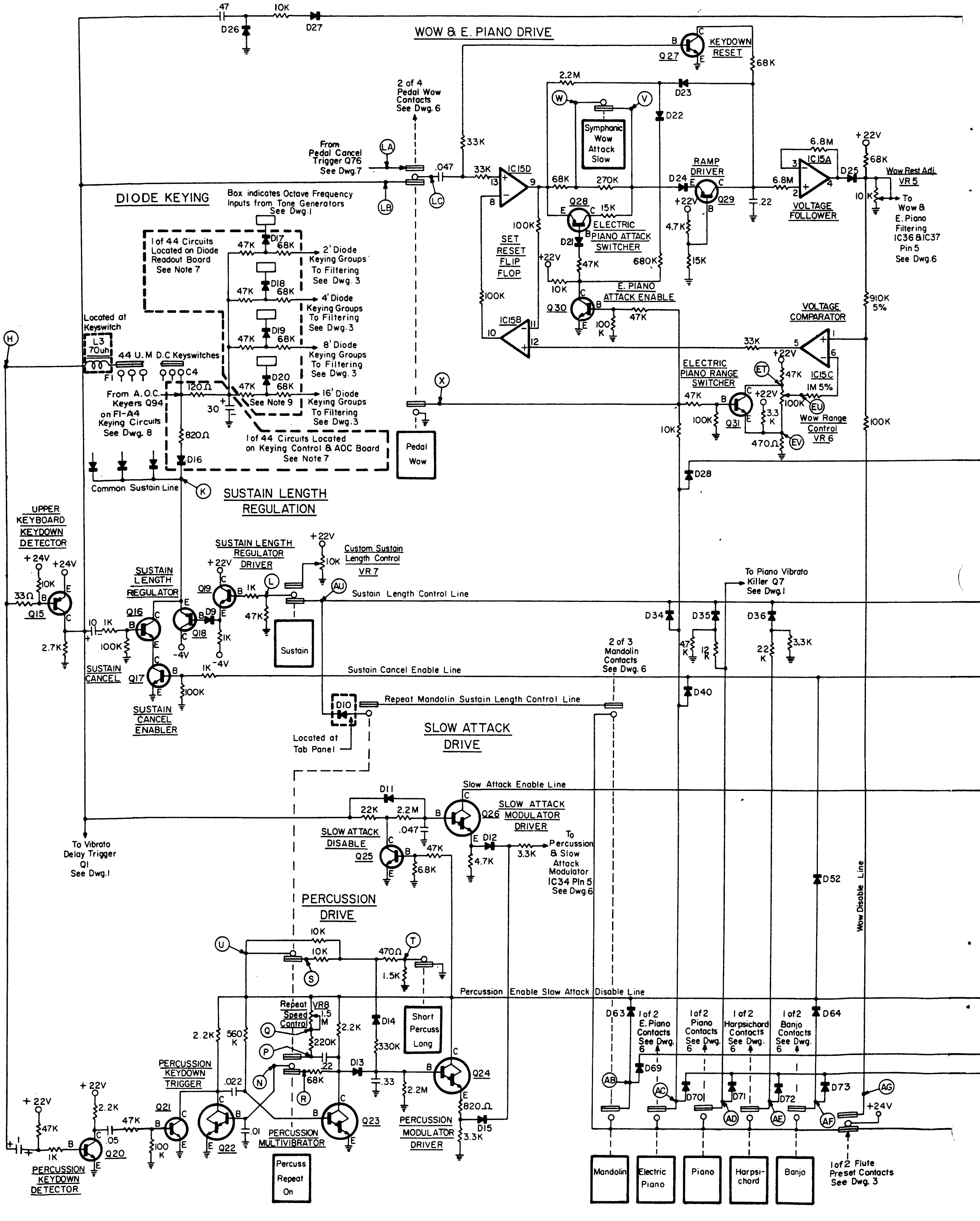
Capacitor Value Chart

Octave	Value
2,3 & 4	.02
5	.01
6	.005
7 & 8	.002
9	.001

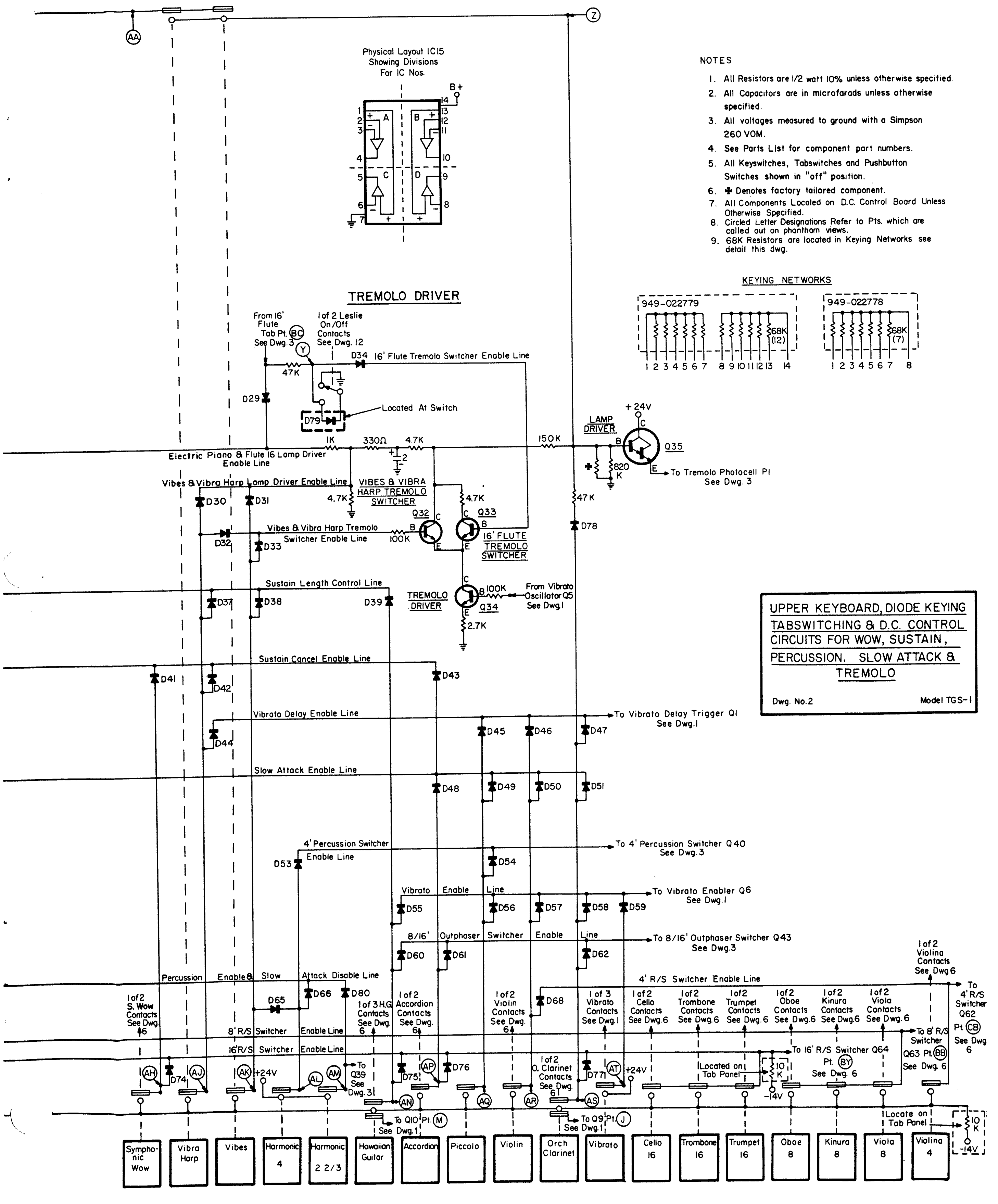
VIBRATO, TONE
GENERATORS & DIVIDERS

Dwg. No. 1
Model TGS-1

SCHEMATIC 2


WOW & E. PIANO DRIVE
DIODE KEYING
SUSTAIN LENGTH REGULATION
SLOW ATTACK DRIVE
PERCUSSION DRIVE
.47
10K
D26
D27
KEYDOWN RESET
Q27
68K
2.2M
D23
D22
Symphonic Wow Attack Slow
2 of 4 Pedal Wow Contacts See Dwg. 6
From Pedal Cancel Trigger Q76 See Dwg.7
.047
33K
IC15D
68K
270K
RAMP DRIVER
D24
Q29
.22
6.8M
IC15A
D25
Wow Rest Adj. VR 5
To Wow & E. Piano Filtering IC36 & IC37 Pin 5 See Dwg.6
VOLTAGE FOLLOWER
+22V
Box indicates Octave Frequency Inputs from Tone Generators See Dwg.1
Q28
15K
ELECTRIC PIANO ATTACK SWITCHER
D21
4.7K
15K
SET RESET FLIP FLOP
100K
680K
47K
E. PIANO ATTACK ENABLE
Q30
IC15B
910K 5%
VOLTAGE COMPARATOR
IC15C
1 of 44 Circuits Located on Diode Readout Board See Note 7
D17
2' Diode Keying Groups To Filtering See Dwg. 3
D18
4' Diode Keying Groups To Filtering See Dwg. 3
D19
8' Diode Keying Groups To Filtering See Dwg. 3
D20
16' Diode Keying Groups To Filtering See Dwg. 3
See Note 9
Located at Keyswitch
L3 70uh
44 U.M D.C Keyswitches
F1
C4
From A.O.C. Keyers Q94 on F1-A4 Keying Circuits See Dwg. 8
120Ω
30
820Ω
D16
1 of 44 Circuits Located on Keying Control & AOC Board See Note 7
Pedal Wow
ELECTRIC PIANO RANGE SWITCHER
Q31
IM 5%
Wow Range Control VR 6
470Ω
D28
Common Sustain Line
UPPER KEYBOARD KEYDOWN DETECTOR
+24V
33Ω
Q15
2.7K
SUSTAIN LENGTH REGULATOR
Q16
Q17
Q18
Q19
D9
SUSTAIN CANCEL
SUSTAIN CANCEL ENABLER
SUSTAIN LENGTH REGULATOR DRIVER
Custom Sustain Length Control VR 7
Sustain
Sustain Length Control Line
To Piano Vibrato Killer Q7 See Dwg.1
D34
D35
D36
3.3K
Sustain Cancel Enable Line
2 of 3 Mandolin Contacts See Dwg. 6
D40
D10
Repeat Mandolin Sustain Length Control Line
Located at Tab Panel
Slow Attack Enable Line
D11
22K
2.2M
SLOW ATTACK MODULATOR DRIVER
Q26
SLOW ATTACK DISABLE
Q25
D12
To Percussion & Slow Attack Modulator IC34 Pin 5 See Dwg.6
To Vibrato Delay Trigger Q1 See Dwg.1
D52
Wow Disable Line
470Ω
1.5K
Percussion Enable Slow Attack Disable Line
Repeat Speed Control VR8
Short Percuss Long
D14
330K
D13
.33
2.2M
Q24
D63
1 of 2 E. Piano Contacts See Dwg. 6
1 of 2 Piano Contacts See Dwg. 6
1 of 2 Harpsichord Contacts See Dwg. 6
1 of 2 Banjo Contacts See Dwg. 6
D64
D69
D70
D71
D72
D73
PERCUSSION KEYDOWN TRIGGER
Q21
Q22
Q23
PERCUSSION MULTIVIBRATOR
PERCUSSION MODULATOR DRIVER
820Ω
D15
3.3K
Q20
PERCUSSION KEYDOWN DETECTOR
Percuss Repeat On
Mandolin
Electric Piano
Piano
Harpsi-chord
Banjo
1 of 2 Flute Preset Contacts See Dwg. 3

SCHEMATIC 2


AA
Z
Physical Layout IC15 Showing Divisions For IC Nos.
B+
1
2
3
4
5
6
7
8
9
10
11
12
13
14
A
B
C
D
TREMOLO DRIVER
From 16' Flute Tab Pt. BC See Dwg. 3
1 of 2 Leslie On/Off Contacts See Dwg. 12
Y
D34
16' Flute Tremolo Switcher Enable Line
47K
D29
Located At Switch
D79
1K
330Ω
4.7K
2
150K
LAMP DRIVER
+24V
C
B
E
Q35
To Tremolo Photocell P1 See Dwg. 3
820 K
Electric Piano & Flute 16 Lamp Driver Enable Line
Vibes & Vibra Harp Lamp Driver Enable Line
VIBES & VIBRA HARP TREMOLO SWITCHER
4.7K
4.7K
Q32
Q33
D30
D31
D32
D33
Vibes & Vibra Harp Tremolo Switcher Enable Line
100K
16' FLUTE TREMOLO SWITCHER
47K
D78
Sustain Length Control Line
D37
D38
D39
TREMOLO DRIVER
Q34
100K
From Vibrato Oscillator Q5 See Dwg. 1
2.7K
Sustain Cancel Enable Line
D41
D42
D43
Vibrato Delay Enable Line
To Vibrato Delay Trigger Q1 See Dwg. 1
D44
D45
D46
D47
Slow Attack Enable Line
D48
D49
D50
D51
4' Percussion Switcher Enable Line
To 4' Percussion Switcher Q40 See Dwg. 3
D53
D54
Vibrato Enable Line
To Vibrato Enabler Q6 See Dwg. 1
D55
D56
D57
D58
D59
8/16' Outphaser Switcher Enable Line
To 8/16' Outphaser Switcher Q43 See Dwg. 3
D60
D61
D62
Percussion Enable & Slow Attack Disable Line
4' R/S Switcher Enable Line
1 of 2 Violina Contacts See Dwg. 6
To 4' R/S Switcher Q62 Pt. CB See Dwg 6
1 of 2 S. Wow Contacts See Dwg. 6
D65
D66
D80
1 of 3 H.G. Contacts See Dwg. 6
1 of 2 Accordion Contacts See Dwg. 6
1 of 2 Violin Contacts See Dwg. 6
D68
1 of 3 Vibrato Contacts See Dwg. 1
1 of 2 Cello Contacts See Dwg. 6
1 of 2 Trombone Contacts See Dwg. 6
1 of 2 Trumpet Contacts See Dwg. 6
1 of 2 Oboe Contacts See Dwg. 6
1 of 2 Kinura Contacts See Dwg. 6
1 of 2 Viola Contacts See Dwg. 6
8' R/S Switcher Enable Line
16' R/S Switcher Enable Line
To 8' R/S Switcher Q63 Pt. BB See Dwg. 6
To 16' R/S Switcher Q64 Pt. BY See Dwg. 6
AH
D74
AJ
AK
+24V
AL
AM
To Q39 See Dwg. 3
D75
AP
D76
AQ
AR
1 of 2 O. Clarinet Contacts See Dwg. 6
D77
AT
+24V
Located on Tab Panel
10 K
-14V
AN
To Q10 Pt. M See Dwg. 1
AS
To Q9 Pt. J See Dwg. 1
Locate on Tab Panel
10 K
-14V
Symphonic Wow
Vibra Harp
Vibes
Harmonic 4
Harmonic 2 2/3
Hawaiian Guitar
Accordion
Piccolo
Violin
Orch Clarinet
Vibrato
Cello 16
Trombone 16
Trumpet 16
Oboe 8
Kinura 8
Viola 8
Violina 4
KEYING NETWORKS
949-022779
1 2 3 4 5 6 7 8 9 10 11 12 13 14
68K (12)
949-022778
1 2 3 4 5 6 7 8
68K (7)

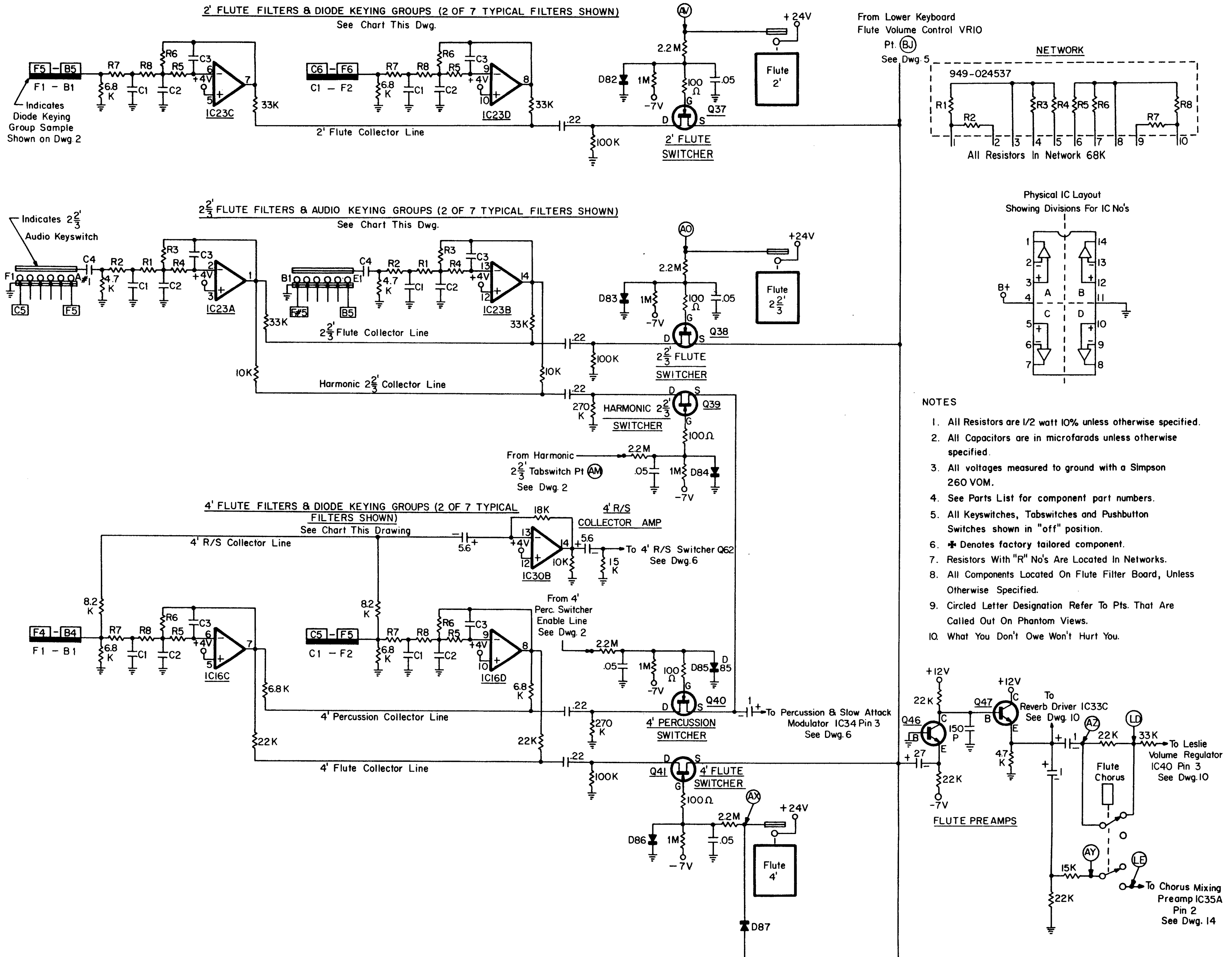
NOTES

1. All Resistors are 1/2 watt 10% unless otherwise specified.
2. All Capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Keyswitches, Tabswitches and Pushbutton Switches shown in "off" position.
6. ✚ Denotes factory tailored component.
7. All Components Located on D.C. Control Board Unless Otherwise Specified.
8. Circled Letter Designations Refer to Pts. which are called out on phanthom views.
9. 68K Resistors are located in Keying Networks see detail this dwg.

UPPER KEYBOARD, DIODE KEYING
TABSWITCHING & D.C. CONTROL
CIRCUITS FOR WOW, SUSTAIN,
PERCUSSION, SLOW ATTACK &
TREMOLO

Dwg. No. 2 Model TGS-1

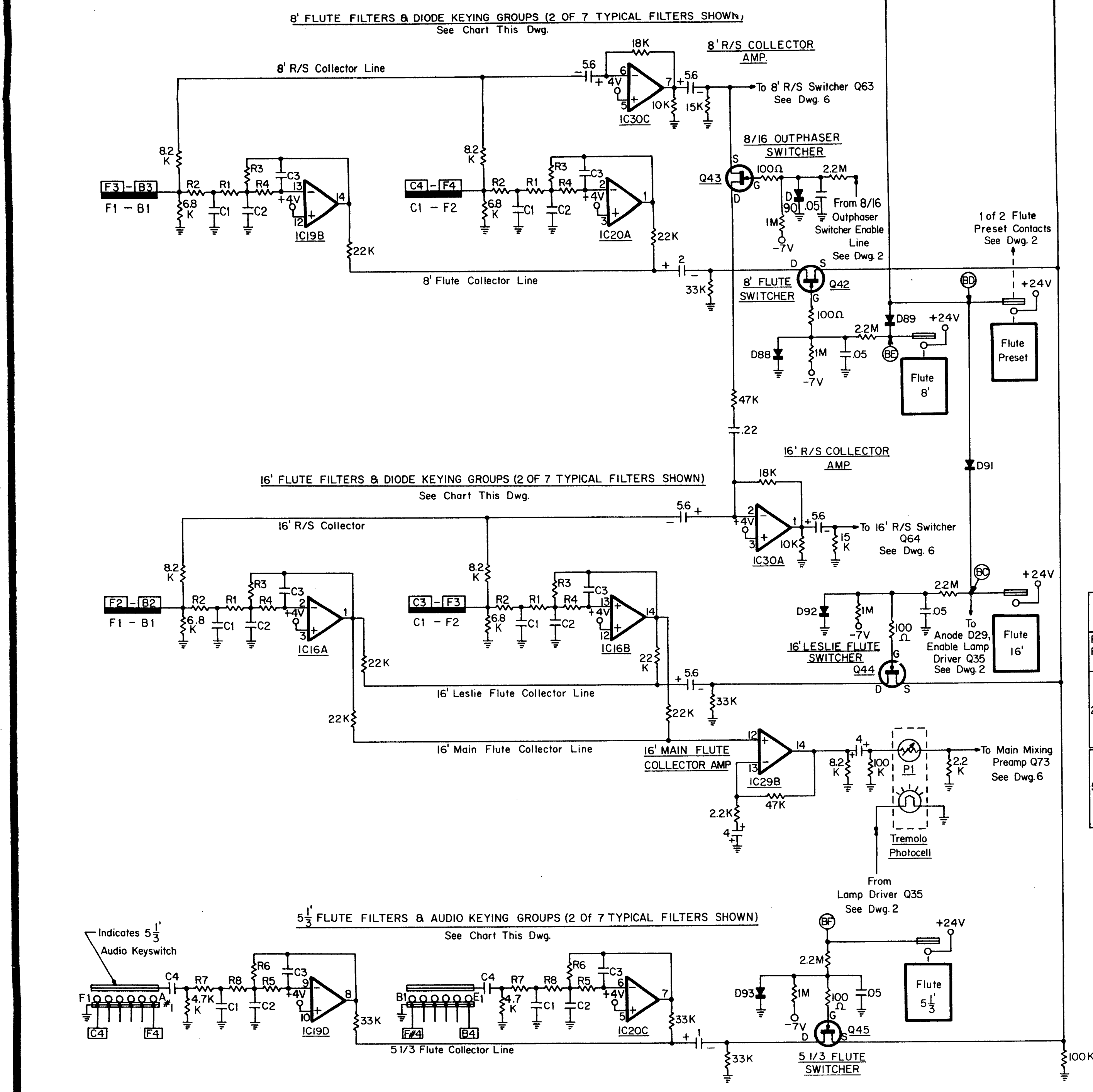
SCHEMATIC 3


2' FLUTE FILTERS & DIODE KEYING GROUPS (2 OF 7 TYPICAL FILTERS SHOWN)
See Chart This Dwg.
F5 - B5
F1 - B1
Indicates Diode Keying Group Sample Shown on Dwg 2
C6 - F6
C1 - F2
IC23C
IC23D
2' Flute Collector Line
2' FLUTE SWITCHER
Q37
Flute 2'
+24V
2⅔' FLUTE FILTERS & AUDIO KEYING GROUPS (2 OF 7 TYPICAL FILTERS SHOWN)
See Chart This Dwg.
Indicates 2⅔' Audio Keyswitch
IC23A
IC23B
2⅔' Flute Collector Line
Harmonic 2⅔' Collector Line
2⅔' FLUTE SWITCHER
Q38
Flute 2⅔'
HARMONIC 2⅔' SWITCHER
Q39
From Harmonic 2⅔' Tabswitch Pt AM See Dwg. 2
4' FLUTE FILTERS & DIODE KEYING GROUPS (2 OF 7 TYPICAL FILTERS SHOWN)
See Chart This Drawing
4' R/S Collector Line
4' R/S COLLECTOR AMP
IC30B
To 4' R/S Switcher Q62 See Dwg.6
F4 - B4
F1 - B1
C5 - F5
C1 - F2
IC16C
IC16D
From 4' Perc. Switcher Enable Line See Dwg. 2
4' Percussion Collector Line
4' PERCUSSION SWITCHER
Q40
To Percussion & Slow Attack Modulator IC34 Pin 3 See Dwg. 6
4' Flute Collector Line
4' FLUTE SWITCHER
Q41
Flute 4'
D87
From Lower Keyboard Flute Volume Control VR10 Pt. BJ See Dwg. 5
NETWORK
949-024537
All Resistors In Network 68K
Physical IC Layout Showing Divisions For IC No's
B+
Q46
Q47
+12V
To Reverb Driver IC33C See Dwg. 10
Flute Chorus
To Leslie Volume Regulator IC40 Pin 3 See Dwg.10
To Chorus Mixing Preamp IC35A Pin 2 See Dwg. 14
FLUTE PREAMPS

NOTES

1. All Resistors are 1/2 watt 10% unless otherwise specified.
2. All Capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Keyswitches, Tabswitches and Pushbutton Switches shown in "off" position.
6. ✚ Denotes factory tailored component.
7. Resistors With "R" No's Are Located In Networks.
8. All Components Located On Flute Filter Board, Unless Otherwise Specified.
9. Circled Letter Designation Refer To Pts. That Are Called Out On Phantom Views.
10. What You Don't Owe Won't Hurt You.

SCHEMATIC 3


8' FLUTE FILTERS & DIODE KEYING GROUPS (2 OF 7 TYPICAL FILTERS SHOWN)
See Chart This Dwg.
8' R/S Collector Line
8' R/S COLLECTOR AMP
18K
5.6
IC30C
10K
15K
To 8' R/S Switcher Q63
See Dwg. 6
8/16 OUTPHASER SWITCHER
Q43
100Ω
2.2M
D90
.05
1M
-7V
From 8/16 Outphaser Switcher Enable Line
See Dwg. 2
1 of 2 Flute Preset Contacts
See Dwg. 2
+24V
Flute Preset
BD
F3 - B3
F1 - B1
C4 - F4
C1 - F2
8.2K
6.8K
R1
R2
R3
R4
C1
C2
C3
+4V
IC19B
IC20A
22K
2
33K
8' Flute Collector Line
8' FLUTE SWITCHER
Q42
D89
BE
Flute 8'
D88
.05
47K
.22
D91
16' FLUTE FILTERS & DIODE KEYING GROUPS (2 OF 7 TYPICAL FILTERS SHOWN)
See Chart This Dwg.
16' R/S Collector
16' R/S COLLECTOR AMP
IC30A
To 16' R/S Switcher Q64
See Dwg. 6
BC
Flute 16'
To Anode D29, Enable Lamp Driver Q35
See Dwg. 2
D92
16' LESLIE FLUTE SWITCHER
Q44
F2 - B2
C3 - F3
IC16A
IC16B
16' Leslie Flute Collector Line
16' Main Flute Collector Line
16' MAIN FLUTE COLLECTOR AMP
IC29B
2.2K
4
P1
Tremolo Photocell
From Lamp Driver Q35
See Dwg. 2
To Main Mixing Preamp Q73
See Dwg. 6
5⅓' FLUTE FILTERS & AUDIO KEYING GROUPS (2 OF 7 TYPICAL FILTERS SHOWN)
See Chart This Dwg.
Indicates 5⅓' Audio Keyswitch
F1
A#1
C4
F4
B1
E1
F#4
B4
R5
R6
R7
R8
4.7K
IC19D
IC20C
5 1/3 Flute Collector Line
BF
Flute 5⅓'
D93
Q45
5 1/3 FLUTE SWITCHER
100K

Flute Footage	Keyboard Note	Octave Freq. Of Key'b Notes	Flute Filter IC No.	C1 Value	C2 Value	C3 Value
2'	F1-B1	F5-B5	IC23C	.01	.014	390P
	C1-F2	C6-F6	IC23D	.0068	.01	270P
	F#2-B2	F#6-B6	IC24C	.0047	.0068	200P
	C2-F3	C7-F7	IC24D	.0033	.0047	130P
	F#3-B3	F#7-B7	IC25C	.0024	.0033	82P
	C3-F4	C8-F8	IC25D	.0016	.0024	68P
	F#4-C4	F#8-C9	IC26C	.0012	.0016	47P
4'	F1-B1	F4-B4	IC16C	.02	.027	750P
	C1-F2	C5-F5	IC16D	.014	.02	560P
	F#2-B2	F#5-B5	IC17C	.01	.014	390P
	C2-F3	C6-F6	IC17D	.0068	.01	270P
	F#3-B3	F#6-B6	IC18C	.0047	.0068	200P
	C3-F4	C7-F7	IC18D	.0033	.0047	130P
	F#4-C4	F#7-C8	IC19C	.0024	.0033	82P
8'	F1-B1	F3-B3	IC19B	.039	.056	.0015
	C1-F2	C4-F4	IC20A	.027	.039	.001
	F#2-B2	F#4-B4	IC20B	.020	.027	750P
	C2-F3	C5-F5	IC21A	.014	.02	560P
	F#3-B3	F#5-B5	IC21B	.01	.014	390P
	C3-F4	C6-F6	IC22A	.0068	.01	270P
	F#4-C4	F#6-C7	IC22B	.0047	.0068	200P
16'	F1-B1	F2-B2	IC16A	.075	.1	.0033
	C1-F2	C3-F3	IC16B	.056	.075	.0022
	F#2-B2	F#3-B3	IC17A	.039	.056	.0015
	C2-F3	C4-F4	IC17B	.027	.039	.001
	F#3-B3	F#4-B4	IC18A	.02	.027	750P
	C3-F4	C5-F5	IC18B	.014	.02	560P
	F#4-C4	F#5-C6	IC19A	.01	.014	390P

UPPER KEYBOARD FLUTE FILTER CHART FOR DIODE KEYED VOICES

Flute Footage	Keyboard Note	Octave Freq. Of Key'b Notes	Flute Filter IC No.	C1 Value	C2 Value	C3 Value	C4 Value
2⅔	F1-A#1	C5-F5	IC23A	.014	.02	560P	.01
	B1-E1	F#5-B5	IC23B	.01	.014	390P	.01
	F2-A#2	C6-F6	IC24A	.0068	.01	270P	.0068
	B2-E2	F#6-B6	IC24B	.0047	.0068	200P	.0068
	F3-A#3	C7-F7	IC25A	.0033	.0047	130P	.0047
	B3-E3	F#7-B7	IC25B	.0024	.0033	82P	.0047
	F4-C4	C8-G8	IC26A	.0016	.0024	68P	.0039
5⅓	F1-A#1	C4-F4	IC19D	.027	.039	.001	.02
	B1-E1	F#4-B4	IC20C	.02	.027	750P	.02
	F2-A#2	C5-F5	IC20D	.014	.02	560P	.01
	B2-E2	F#5-B5	IC21C	.01	.014	390P	.01
	F3-A#3	C6-F6	IC21D	.0068	.01	270P	.0068
	B3-E3	F#6-B6	IC22C	.0047	.0068	200P	.0068
	F4-C4	C7-G7	IC22D	.0033	.0047	130P	.0047

UPPER KEYBOARD FLUTE FILTER CHART FOR AUDIO KEYED VOICES

UPPER KEYBOARD FLUTE FILTERS, TABSWITCHES, DIODE KEYING & AUDIO KEYING GROUPS

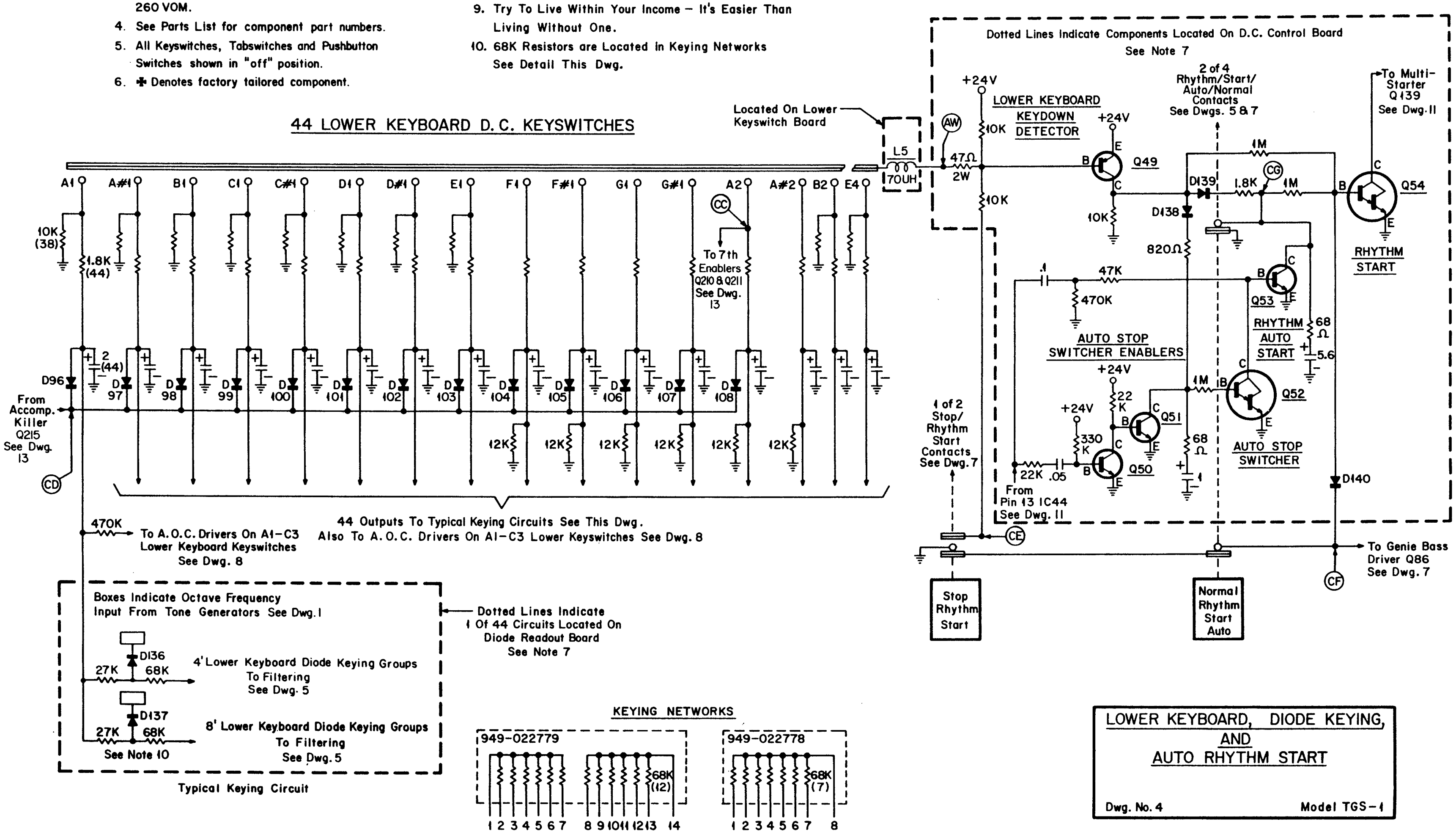
Dwg. No. 3

Model TGS-1

SCHEMATIC 4

NOTES

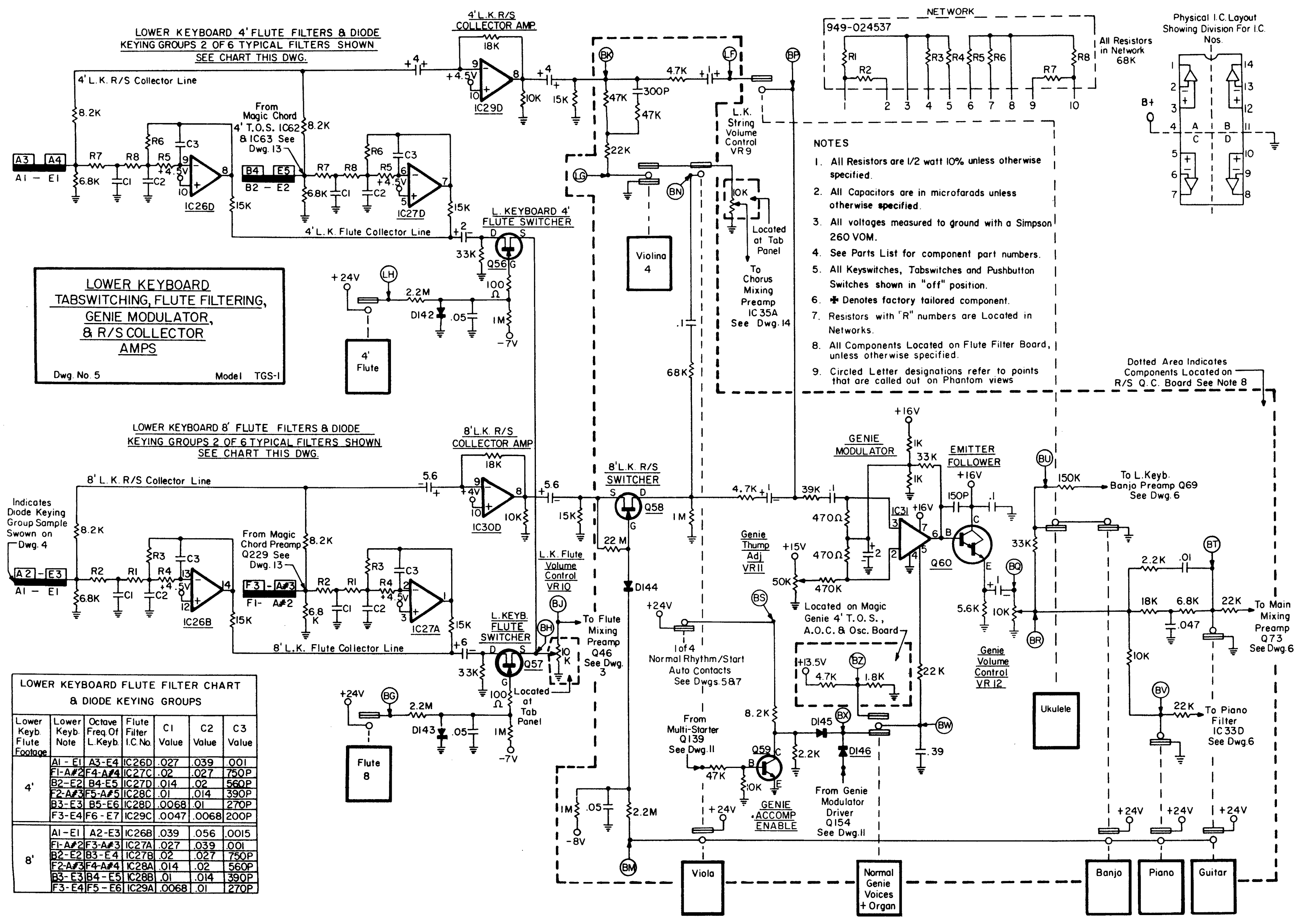
1. All Resistors are 1/2 watt 10% unless otherwise specified.
2. All Capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Keyswitches, Tabswitches and Pushbutton Switches shown in "off" position.
6. ✚ Denotes factory tailored component.
7. All Components Located On A.O.C. & Keyer Board Unless Otherwise Specified.
8. Circled Letter Designations Refer To Pts Which Are Called Out On Phantom Views.
9. Try To Live Within Your Income – It's Easier Than Living Without One.
10. 68K Resistors are Located In Keying Networks See Detail This Dwg.


44 LOWER KEYBOARD D.C. KEYSWITCHES
Located On Lower Keyswitch Board
A1
A#1
B1
C1
C#1
D1
D#1
E1
F1
F#1
G1
G#1
A2
A#2
B2
E4
10K (38)
1.8K (44)
2 (44)
D96
D 97
D 98
D 99
D 100
D 101
D 102
D 103
D 104
D 105
D 106
D 107
D 108
12K
CC
To 7th Enablers Q210 & Q211 See Dwg. 13
From Accomp. Killer Q215 See Dwg. 13
CD
470K
To A.O.C. Drivers On A1–C3 Lower Keyboard Keyswitches See Dwg. 8
44 Outputs To Typical Keying Circuits See This Dwg. Also To A.O.C. Drivers On A1–C3 Lower Keyswitches See Dwg. 8
Boxes Indicate Octave Frequency Input From Tone Generators See Dwg. 1
D136
27K
68K
4' Lower Keyboard Diode Keying Groups To Filtering See Dwg. 5
D137
8' Lower Keyboard Diode Keying Groups To Filtering See Dwg. 5
See Note 10
Typical Keying Circuit
Dotted Lines Indicate 1 Of 44 Circuits Located On Diode Readout Board See Note 7
KEYING NETWORKS
949-022779
68K (12)
1 2 3 4 5 6 7 8 9 10 11 12 13 14
949-022778
68K (7)
1 2 3 4 5 6 7 8
L5
70UH
Dotted Lines Indicate Components Located On D.C. Control Board See Note 7
+24V
AW
47Ω 2W
10K
LOWER KEYBOARD KEYDOWN DETECTOR
+24V
B
E
C
Q49
10K
D138
820Ω
D139
1.8K
CG
1M
1M
2 of 4 Rhythm/Start/Auto/Normal Contacts See Dwgs. 5 & 7
To Multi-Starter Q139 See Dwg. 11
Q54
RHYTHM START
Q53
RHYTHM AUTO START
68 Ω
5.6
.1
47K
470K
AUTO STOP SWITCHER ENABLERS
+24V
22 K
Q51
330 K
Q50
22K
.05
From Pin 13 IC44 See Dwg. 11
1M
68 Ω
1
Q52
AUTO STOP SWITCHER
D140
1 of 2 Stop/Rhythm Start Contacts See Dwg. 7
CE
Stop Rhythm Start
Normal Rhythm Start Auto
To Genie Bass Driver Q86 See Dwg. 7
CF

LOWER KEYBOARD, DIODE KEYING, AND AUTO RHYTHM START

Dwg. No. 4 Model TGS-1

SCHEMATIC 5



LOWER KEYBOARD 4' FLUTE FILTERS & DIODE KEYING GROUPS 2 OF 6 TYPICAL FILTERS SHOWN SEE CHART THIS DWG.
4' L.K. R/S Collector Line
4' L.K. R/S COLLECTOR AMP
IC29D
IC26D
IC27D
A3 A4
A1 – E1
B4 E5
B2 – E2
From Magic Chord 4' T.O.S. IC62 & IC63 See Dwg. 13
4' L.K. Flute Collector Line
L. KEYBOARD 4' FLUTE SWITCHER
Q56
4' Flute
LOWER KEYBOARD 8' FLUTE FILTERS & DIODE KEYING GROUPS 2 OF 6 TYPICAL FILTERS SHOWN SEE CHART THIS DWG.
8' L.K. R/S Collector Line
8' L.K. R/S COLLECTOR AMP
IC30D
IC26B
IC27A
Indicates Diode Keying Group Sample Swown on Dwg. 4
A2 – E3
F3 – A#3
F1 – A#2
From Magic Chord Preamp Q229 See Dwg. 13
8' L.K. Flute Collector Line
L. KEYB. FLUTE SWITCHER
Q57
Located at Tab Panel
Flute 8
8' L.K. R/S SWITCHER
Q58
L.K. Flute Volume Control VR10
To Flute Mixing Preamp Q46 See Dwg. 3
L.K. String Volume Control VR9
Located at Tab Panel
To Chorus Mixing Preamp IC35A See Dwg. 14
Violina 4
NETWORK
949-024537
All Resistors in Network 68K
Physical I.C. Layout Showing Division For I.C. Nos.
GENIE MODULATOR
IC31
EMITTER FOLLOWER
Q60
Genie Thump Adj VR11
Located on Magic Genie 4' T.O.S., A.O.C. & Osc. Board
1 of 4 Normal Rhythm/Start Auto Contacts See Dwgs 5 & 7
From Multi-Starter Q139 See Dwg. 11
Q59
GENIE ACCOMP ENABLE
From Genie Modulator Driver Q154 See Dwg. 11
Genie Volume Control VR12
To L.Keyb. Banjo Preamp Q69 See Dwg. 6
To Main Mixing Preamp Q73 See Dwg. 6
To Piano Filter IC33D See Dwg. 6
Dotted Area Indicates Components Located on R/S Q.C. Board See Note 8
Ukulele
Viola
Normal Genie Voices + Organ
Banjo
Piano
Guitar

NOTES

1. All Resistors are 1/2 watt 10% unless otherwise specified.
2. All Capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Keyswitches, Tabswitches and Pushbutton Switches shown in "off" position.
6. ✱ Denotes factory tailored component.
7. Resistors with "R" numbers are Located in Networks.
8. All Components Located on Flute Filter Board, unless otherwise specified.
9. Circled Letter designations refer to points that are called out on Phantom views

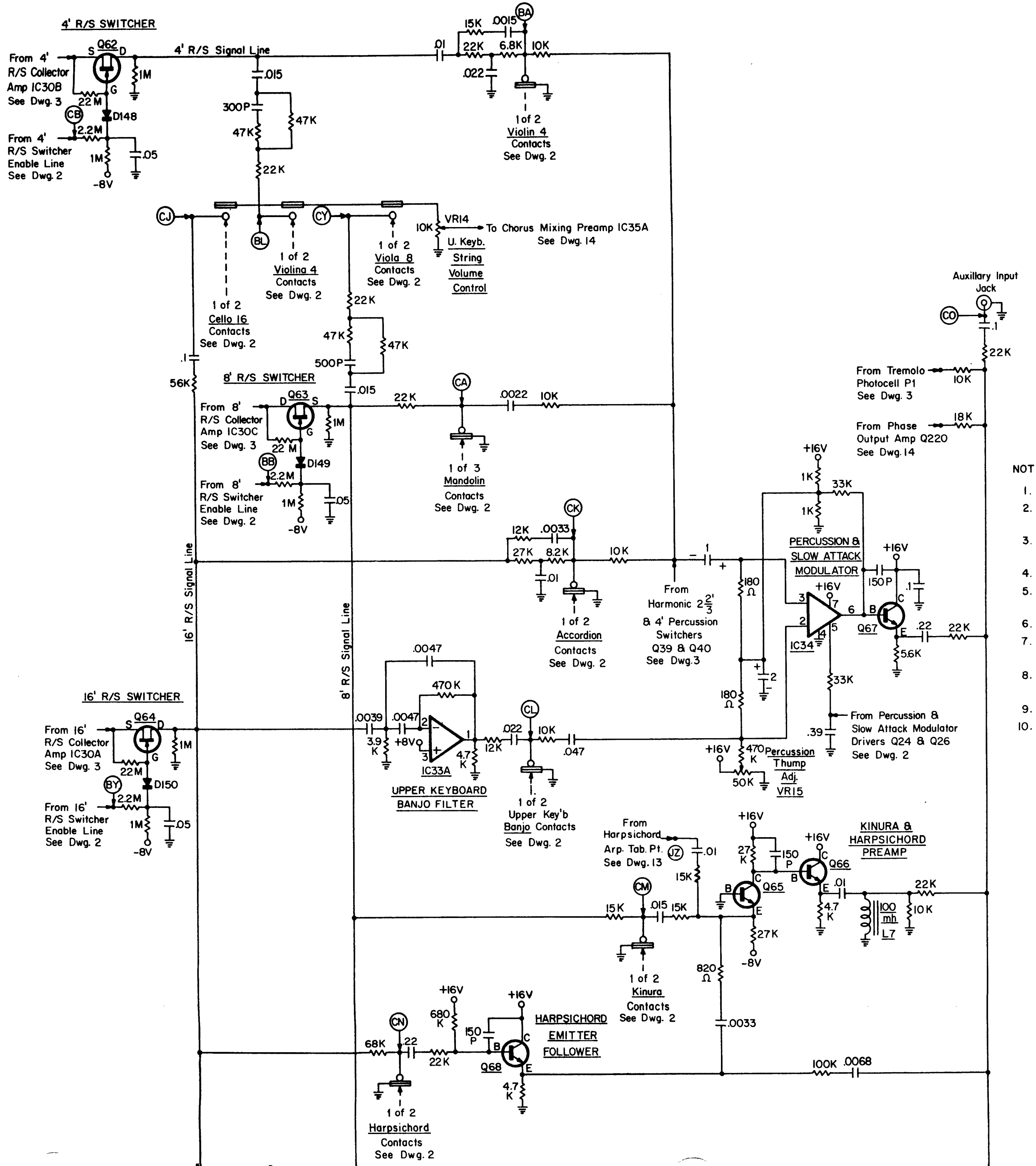
LOWER KEYBOARD
TABSWITCHING, FLUTE FILTERING,
GENIE MODULATOR,
& R/S COLLECTOR
AMPS

Dwg. No. 5 Model TGS-1

LOWER KEYBOARD FLUTE FILTER CHART & DIODE KEYING GROUPS

Lower Keyb. Flute Footage	Lower Keyb. Note	Octave Freq. Of L.Keyb.	Flute Filter I.C. No.	C1 Value	C2 Value	C3 Value
4'	A1 - E1	A3-E4	IC26D	.027	.039	.001
	F1-A#2	F4-A#4	IC27C	.02	.027	750P
	B2-E2	B4-E5	IC27D	.014	.02	560P
	F2-A#3	F5-A#5	IC28C	.01	.014	390P
	B3-E3	B5-E6	IC28D	.0068	.01	270P
	F3-E4	F6 - E7	IC29C	.0047	.0068	200P
8'	A1-E1	A2-E3	IC26B	.039	.056	.0015
	F1-A#2	F3-A#3	IC27A	.027	.039	.001
	B2-E2	B3-E4	IC27B	.02	.027	750P
	F2-A#3	F4-A#4	IC28A	.014	.02	560P
	B3-E3	B4 - E5	IC28B	.01	.014	390P
	F3-E4	F5 - E6	IC29A	.0068	.01	270P

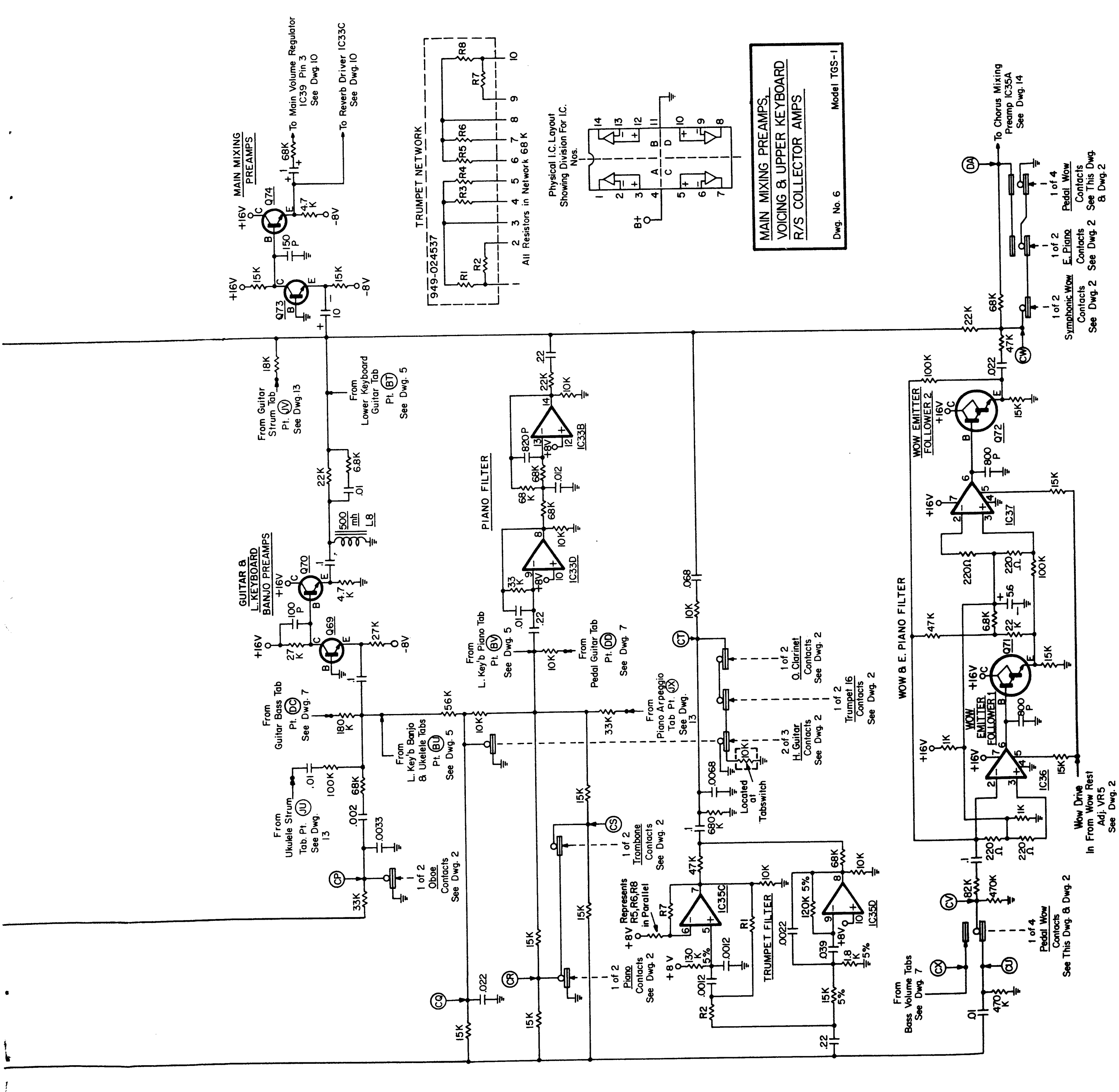
SCHEMATIC 6


4' R/S SWITCHER
From 4' R/S Collector Amp IC30B See Dwg. 3
Q62
S
D
G
22M
1M
CB
D148
2.2M
From 4' R/S Switcher Enable Line See Dwg. 2
1M
.05
-8V
4' R/S Signal Line
.015
300P
47K
47K
22K
.01
15K
.0015
BA
22K
6.8K
10K
.022
1 of 2
Violin 4
Contacts
See Dwg. 2
CJ
BL
CY
1 of 2
Cello 16
Contacts
See Dwg. 2
1 of 2
Violina 4
Contacts
See Dwg. 2
1 of 2
Viola 8
Contacts
See Dwg. 2
10K
VR14
U. Keyb. String Volume Control
To Chorus Mixing Preamp IC35A See Dwg. 14
.1
56K
22K
47K
47K
500P
.015
8' R/S SWITCHER
From 8' R/S Collector Amp IC30C See Dwg. 3
Q63
D
S
G
1M
22 M
BB
D149
2.2M
From 8' R/S Switcher Enable Line See Dwg. 2
1M
.05
-8V
22K
CA
.0022
10K
1 of 3
Mandolin
Contacts
See Dwg. 2
16' R/S Signal Line
8' R/S Signal Line
CK
12K
.0033
27K
8.2K
.01
10K
1 of 2
Accordion
Contacts
See Dwg. 2
From Harmonic 2 2/3' & 4' Percussion Switchers Q39 & Q40 See Dwg. 3
1
180 Ω
180 Ω
2
+16V
1K
33K
1K
PERCUSSION & SLOW ATTACK MODULATOR
IC34
+16V
3
2
7
6
4
5
150P
.1
+16V
Q67
B
C
E
.22
22K
5.6K
33K
.39
From Percussion & Slow Attack Modulator Drivers Q24 & Q26 See Dwg. 2
+16V
470 K
Percussion Thump Adj. VR15
50K
Auxiliary Input Jack
CO
.1
22K
From Tremolo Photocell P1 See Dwg. 3
10K
From Phase Output Amp Q220 See Dwg. 14
18K
16' R/S SWITCHER
From 16' R/S Collector Amp IC30A See Dwg. 3
Q64
S
D
G
1M
22M
BY
D150
2.2M
From 16' R/S Switcher Enable Line See Dwg. 2
1M
.05
-8V
.0047
470 K
.0039
.0047
3.9 K
+8V
IC33A
4.7 K
12K
UPPER KEYBOARD BANJO FILTER
CL
.022
10K
.047
1 of 2
Upper Key'b
Banjo Contacts
See Dwg. 2
From Harpsichord Arp. Tab. Pt. See Dwg. 13
JZ
.01
15K
CM
15K
.015
15K
1 of 2
Kinura
Contacts
See Dwg. 2
+16V
27 K
150 P
Q65
B
C
E
27K
-8V
+16V
Q66
C
B
E
.01
4.7 K
100 mh
L7
22K
10K
KINURA & HARPSICHORD PREAMP
820 Ω
.0033
100K
.0068
CN
68K
.22
22K
+16V
680 K
150 P
+16V
Q68
B
C
E
4.7 K
HARPSICHORD EMITTER FOLLOWER
1 of 2
Harpsichord
Contacts
See Dwg. 2

NOTES

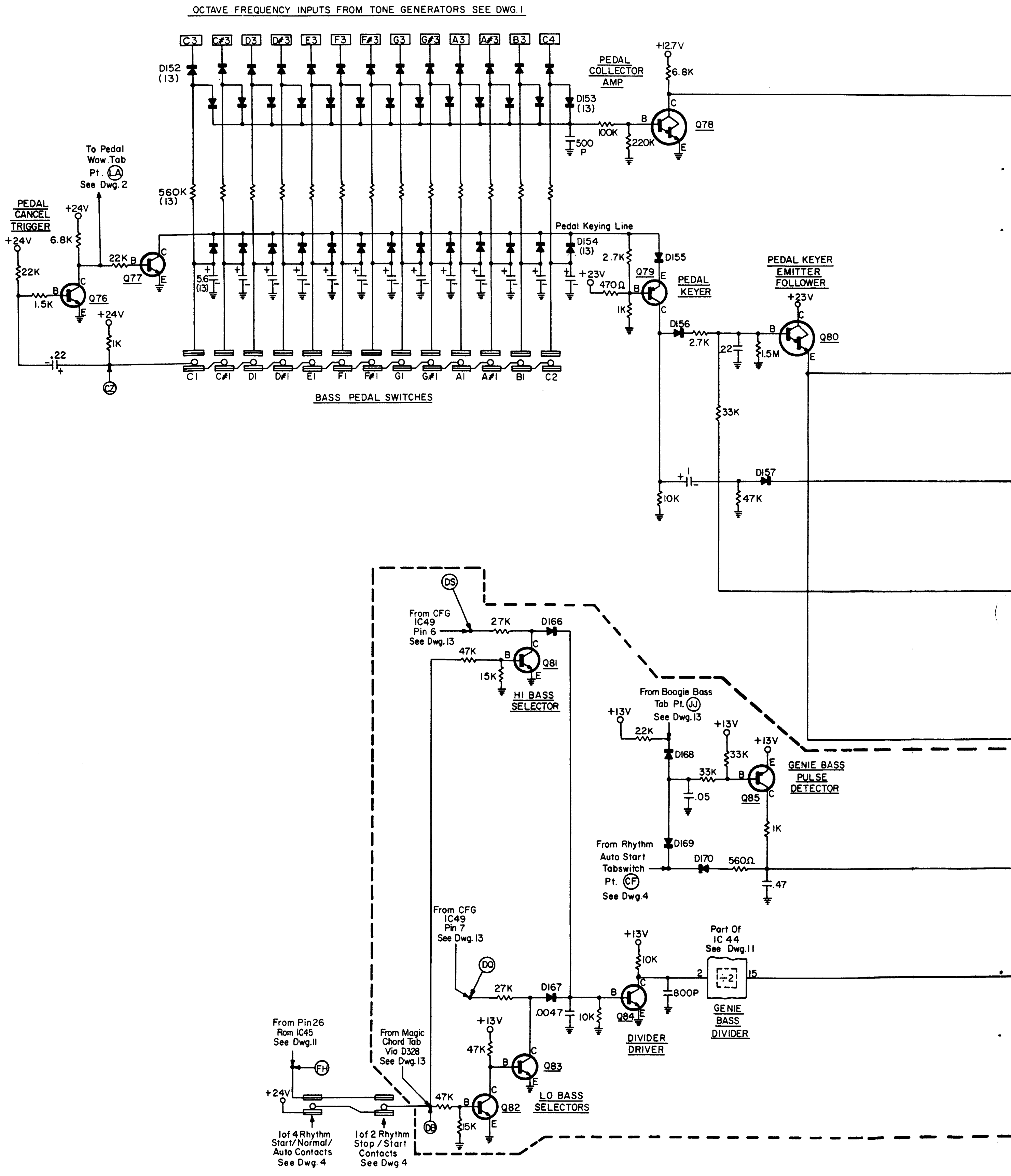
1. All Resistors are 1/2 watt 10% unless otherwise specified.
2. All Capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Keyswitches, Tabswitches and Pushbutton Switches shown in "off" position.
6. ✚ Denotes factory tailored component.
7. Circled Letter Designations Refer to Points Which Are Called Out on Phantom Views.
8. All Components Located on R/S Q.C. Board Unless Otherwise Specified.
9. Resistors with "R" Numbers Are Contained in Networks.
10. To Rest is to Rust—To be Active is to Achieve.

SCHEMATIC 6

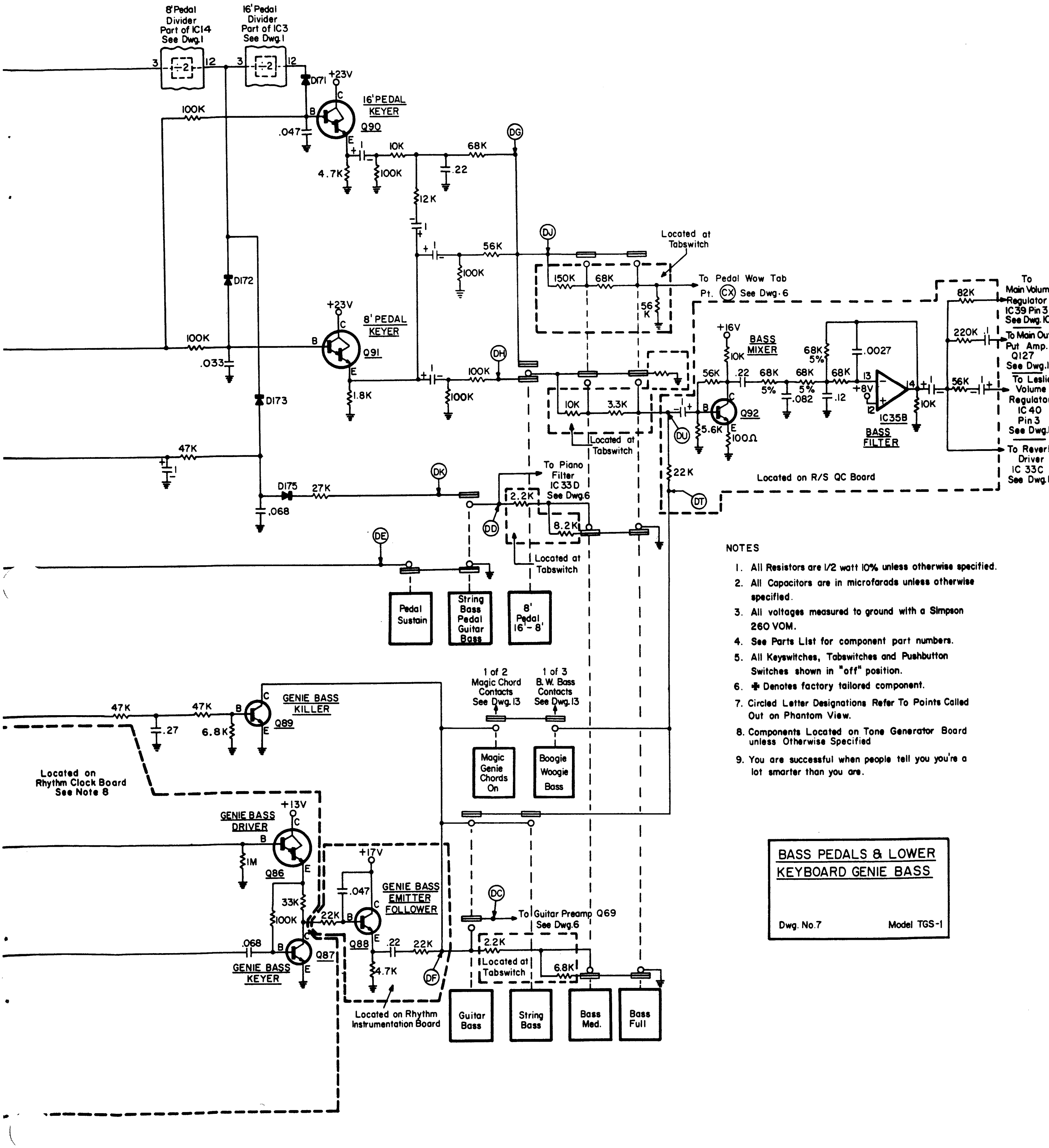


MAIN MIXING PREAMPS, VOICING & UPPER KEYBOARD R/S COLLECTOR AMPS
Dwg. No. 6
Model TGS-1
MAIN MIXING PREAMPS
To Main Volume Regulator IC39 Pin 3 See Dwg.10
To Reverb Driver IC33C See Dwg.10
TRUMPET NETWORK
949-024537
All Resistors in Network 68 K
Physical I.C. Layout Showing Division For I.C. Nos.
GUITAR & L. KEYBOARD BANJO PREAMPS
From Guitar Strum Tab Pt. JV See Dwg.13
From Lower Keyboard Guitar Tab Pt. BT See Dwg. 5
From Guitar Bass Tab Pt. DC See Dwg. 7
From L. Key'b Banjo & Ukelele Tabs Pt. BU See Dwg. 5
From Ukulele Strum Tab. Pt. JU See Dwg. 13
1 of 2 Oboe Contacts See Dwg. 2
PIANO FILTER
From L. Key'b Piano Tab Pt. BV See Dwg. 5
From Pedal Guitar Tab Pt. DD See Dwg. 7
From Piano Arpeggio Tab Pt. JX See Dwg. 13
1 of 2 Trombone Contacts See Dwg. 2
1 of 2 Piano Contacts See Dwg. 2
Represents R5,R6,R8 in Parallel
TRUMPET FILTER
1 of 2 O. Clarinet Contacts See Dwg. 2
1 of 2 Trumpet 16 Contacts See Dwg. 2
2 of 3 H. Guitar Contacts See Dwg. 2
Located at Tabswitch
WOW & E. PIANO FILTER
WOW EMITTER FOLLOWER 2
WOW EMITTER FOLLOWER 1
To Chorus Mixing Preamp IC35A See Dwg.14
1 of 4 Pedal Wow Contacts See This Dwg. & Dwg.2
1 of 2 E. Piano Contacts See Dwg. 2
1 of 2 Symphonic Wow Contacts See Dwg. 2
Wow Drive In From Wow Rest Adj. VR5 See Dwg. 2
From Bass Volume Tabs See Dwg. 7
1 of 4 Pedal Wow Contacts See This Dwg. & Dwg. 2
Q69
Q70
Q71
Q72
Q73
Q74
IC33B
IC33D
IC35C
IC35D
IC36
IC37
L8
CP
CQ
CR
CS
CT
CV
CW
CX
DA
DJ
+16V
-8V
+8V
B+

SCHEMATIC 7


OCTAVE FREQUENCY INPUTS FROM TONE GENERATORS SEE DWG. I
C3
C#3
D3
D#3
E3
F3
F#3
G3
G#3
A3
A#3
B3
C4
D152 (13)
D153 (13)
500 P
100K
220K
PEDAL COLLECTOR AMP
+12.7V
6.8K
C
B
E
Q78
560K (13)
To Pedal Wow Tab Pt. LA See Dwg. 2
PEDAL CANCEL TRIGGER
+24V
+24V
6.8K
22K
1.5K
Q76
22K
Q77
+24V
1K
.22
CZ
Pedal Keying Line
D154 (13)
5.6 (13)
2.7K
D155
+23V
470Ω
Q79
PEDAL KEYER
1K
D156
2.7K
.22
1.5M
PEDAL KEYER EMITTER FOLLOWER
+23V
Q80
C1
C#1
D1
D#1
E1
F1
F#1
G1
G#1
A1
A#1
B1
C2
BASS PEDAL SWITCHES
33K
1
D157
10K
47K
DS
From CFG IC49 Pin 6 See Dwg. 13
27K
D166
47K
15K
Q81
HI BASS SELECTOR
From Boogie Bass Tab Pt. JJ See Dwg. 13
+13V
22K
D168
+13V
33K
33K
+13V
.05
Q85
GENIE BASS PULSE DETECTOR
1K
From Rhythm Auto Start Tabswitch Pt. CF See Dwg. 4
D169
D170
560Ω
.47
From CFG IC49 Pin 7 See Dwg. 13
DQ
27K
D167
.0047
10K
+13V
10K
Q84
DIVIDER DRIVER
800P
Part Of IC 44 See Dwg. 11
2
÷2
15
GENIE BASS DIVIDER
From Pin 26 Rom IC45 See Dwg. 11
FH
+24V
From Magic Chord Tab Via D328 See Dwg. 13
+13V
47K
Q83
LO BASS SELECTORS
47K
Q82
15K
DB
1 of 4 Rhythm Start/Normal/ Auto Contacts See Dwg. 4
1 of 2 Rhythm Stop / Start Contacts See Dwg 4

SCHEMATIC 7


8'Pedal Divider Part of IC14 See Dwg.1
16'Pedal Divider Part of IC3 See Dwg.1
÷2
3
12
D171
+23V
C
B
E
16'PEDAL KEYER
Q90
100K
.047
4.7K
1
10K
100K
68K
.22
DG
12K
1
DJ
56K
100K
D172
Located at Tabswitch
150K
68K
56 K
To Pedal Wow Tab Pt. CX See Dwg·6
+23V
8' PEDAL KEYER
Q91
100K
.033
1.8K
DH
100K
100K
D173
10K
3.3K
Located at Tabswitch
47K
1
D175
27K
.068
DK
To Piano Filter IC 33D See Dwg.6
2.2K
8.2K
DD
Located at Tabswitch
DE
Pedal Sustain
String Bass Pedal Guitar Bass
8' Pedal 16'-8'
+16V
BASS MIXER
10K
56K
.22
68K 5%
68K 5%
68K 5%
68K
.082
.12
.0027
13
+8V
12
14
IC35B
BASS FILTER
10K
Q92
5.6K
100Ω
DU
22K
DT
Located on R/S QC Board
82K
220K
.1
56K
To Main Volum Regulator IC39 Pin 3 See Dwg.IC
To Main Out Put Amp. Q127 See Dwg.I
To Leslie Volume Regulator IC 40 Pin 3 See Dwg.
To Reverb Driver IC 33C See Dwg.I
47K
47K
.27
6.8K
GENIE BASS KILLER
Q89
1 of 2 Magic Chord Contacts See Dwg.13
1 of 3 B.W. Bass Contacts See Dwg.13
Magic Genie Chords On
Boogie Woogie Bass
Located on Rhythm Clock Board See Note 8
+13V
GENIE BASS DRIVER
Q86
1M
33K
100K
.068
GENIE BASS KEYER
Q87
+17V
.047
GENIE BASS EMITTER FOLLOWER
22K
Q88
.22
22K
4.7K
DF
Located on Rhythm Instrumentation Board
DC
To Guitar Preamp Q69 See Dwg.6
2.2K
6.8K
Located at Tabswitch
Guitar Bass
String Bass
Bass Med.
Bass Full

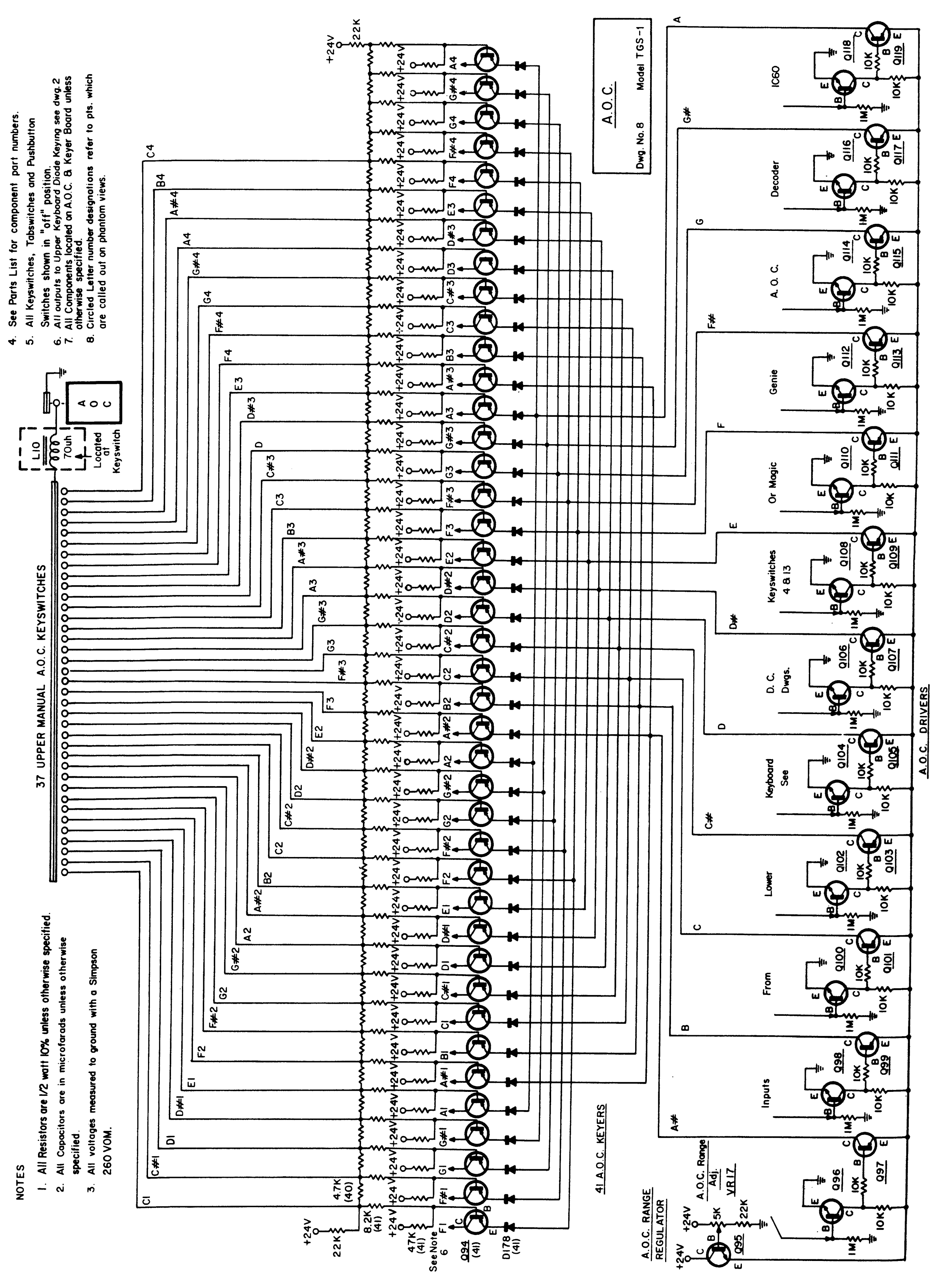
NOTES

1. All Resistors are 1/2 watt 10% unless otherwise specified.
2. All Capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Keyswitches, Tabswitches and Pushbutton Switches shown in "off" position.
6. ✚ Denotes factory tailored component.
7. Circled Letter Designations Refer To Points Called Out on Phantom View.
8. Components Located on Tone Generator Board unless Otherwise Specified
9. You are successful when people tell you you're a lot smarter than you are.

BASS PEDALS & LOWER KEYBOARD GENIE BASS

Dwg. No.7 Model TGS-1

SCHEMATIC 8


37 UPPER MANUAL A.O.C. KEYSWITCHES
41 A.O.C. KEYERS
A.O.C. DRIVERS
A.O.C. RANGE REGULATOR
A.O.C. Range Adj. VR17
L10 70uh Located at Keyswitch
A O C
A.O.C.
Dwg. No. 8
Model TGS-1
Inputs From Lower Keyboard See D.C. Dwgs. Keyswitches 4 8 13 Or Magic Genie A.O.C. Decoder IC60
Q94 (41)
D178 (41)
47K (41)
See Note 6
8.2K (41)
4.7K (40)
22K
+24V
5K
10K
1M
Q95
Q96
Q97
Q98
Q99
Q100
Q101
Q102
Q103
Q104
Q105
Q106
Q107
Q108
Q109
Q110
Q111
Q112
Q113
Q114
Q115
Q116
Q117
Q118
Q119
C1 C#1 D1 D#1 E1 F1 F#1 G1 G#1 A1 A#1 B1
C2 C#2 D2 D#2 E2 F2 F#2 G2 G#2 A2 A#2 B2
C3 C#3 D3 D#3 E3 F3 F#3 G3 G#3 A3 A#3 B3
C4 F4 F#4 G4 G#4 A4 B4 E3 D#3 A#4
A A# B C C# D D# E F F# G G#

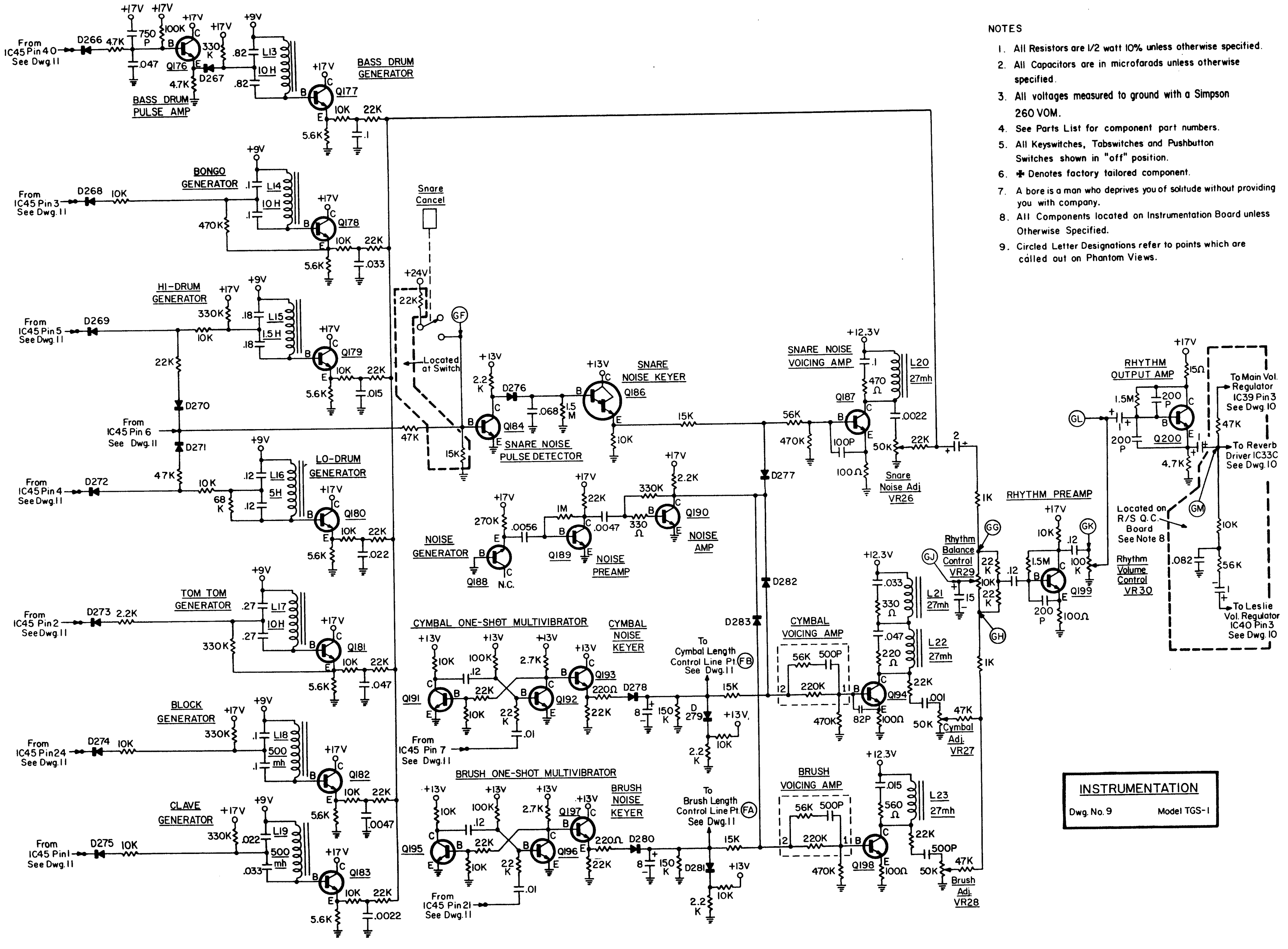
NOTES

1. All Resistors are 1/2 watt 10% unless otherwise specified.
2. All Capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Keyswitches, Tabswitches and Pushbutton Switches shown in "off" position.
6. All outputs to Upper Keyboard Diode Keying see dwg. 2
7. All Components located on A.O.C. & Keyer Board unless otherwise specified.
8. Circled Letter number designations refer to pts. which are called out on phantom views.

SCHEMATIC 9

NOTES

1. All Resistors are 1/2 watt 10% unless otherwise specified.
2. All Capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Keyswitches, Tabswitches and Pushbutton Switches shown in "off" position.
6. ✚ Denotes factory tailored component.
7. A bore is a man who deprives you of solitude without providing you with company.
8. All Components located on Instrumentation Board unless Otherwise Specified.
9. Circled Letter Designations refer to points which are called out on Phantom Views.

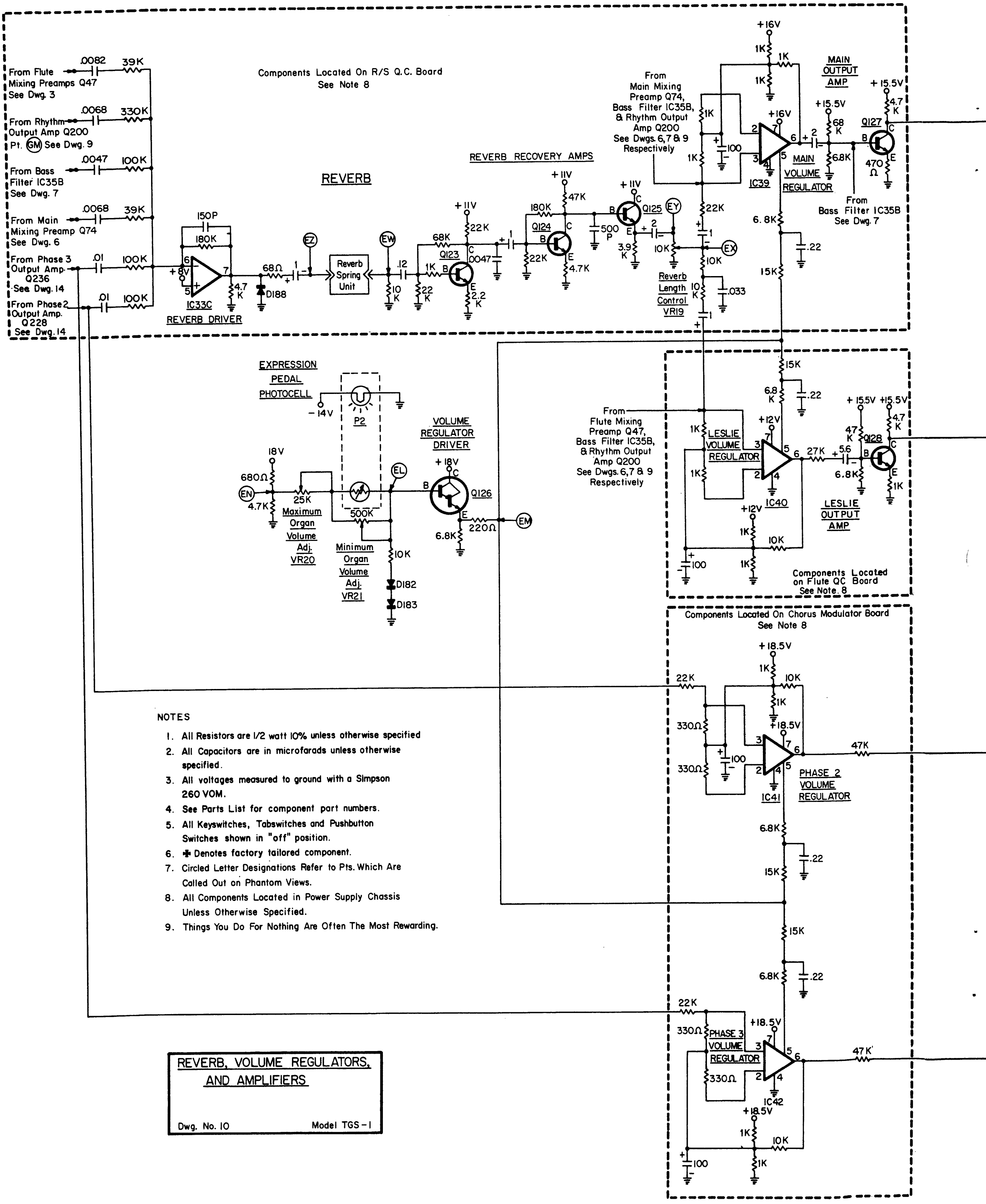


From IC45 Pin 40 See Dwg. 11
D266
47K
750 P
.047
+17V
100K
Q176
330 K
D267
4.7K
BASS DRUM PULSE AMP
+9V
.82
L13
10 H
BASS DRUM GENERATOR
Q177
10K
22K
5.6K
.1
From IC45 Pin 3 See Dwg. 11
D268
BONGO GENERATOR
L14
Q178
470K
.033
From IC45 Pin 5 See Dwg. 11
D269
HI-DRUM GENERATOR
330K
.18
L15
1.5 H
Q179
.015
D270
From IC45 Pin 6 See Dwg. 11
D271
From IC45 Pin 4 See Dwg. 11
D272
LO-DRUM GENERATOR
.12
L16
5H
68 K
Q180
.022
From IC45 Pin 2 See Dwg. 11
D273
2.2K
TOM TOM GENERATOR
.27
L17
Q181
.047
From IC45 Pin 24 See Dwg. 11
D274
BLOCK GENERATOR
L18
500 mh
Q182
.0047
From IC45 Pin 1 See Dwg. 11
D275
CLAVE GENERATOR
L19
Q183
.0022
Snare Cancel
+24V
GF
Located at Switch
15K
+13V
2.2 K
D276
.068
1.5 M
Q184
SNARE NOISE PULSE DETECTOR
SNARE NOISE KEYER
Q186
NOISE GENERATOR
Q188
N.C.
270K
.0056
1M
Q189
.0047
NOISE PREAMP
Q190
NOISE AMP
SNARE NOISE VOICING AMP
+12.3V
470 Ω
L20
27mh
Q187
100P
100Ω
56K
470K
Snare Noise Adj VR26
50K
D277
D282
D283
CYMBAL ONE-SHOT MULTIVIBRATOR
Q191
Q192
Q193
2.7K
From IC45 Pin 7 See Dwg. 11
CYMBAL NOISE KEYER
220Ω
D278
150 K
8
D 279
To Cymbal Length Control Line Pt. FB See Dwg. 11
CYMBAL VOICING AMP
500P
220K
Q194
82P
330 Ω
L21
L22
.001
Cymbal Adj. VR27
BRUSH ONE-SHOT MULTIVIBRATOR
Q195
Q196
Q197
From IC45 Pin 21 See Dwg. 11
BRUSH NOISE KEYER
D280
D281
To Brush Length Control Line Pt. FA See Dwg. 11
BRUSH VOICING AMP
Q198
560 Ω
L23
Brush Adj. VR28
1K
GG
GH
GJ
Rhythm Balance Control VR29
RHYTHM PREAMP
GK
1.5M
Q199
200 P
RHYTHM OUTPUT AMP
15Ω
Q200
GL
GM
Located on R/S Q.C. Board See Note 8
Rhythm Volume Control VR30
To Main Vol. Regulator IC39 Pin 3 See Dwg. 10
To Reverb Driver IC33C See Dwg. 10
To Leslie Vol. Regulator IC40 Pin 3 See Dwg. 10
56K
.082

INSTRUMENTATION

Dwg. No. 9 Model TGS-1

SCHEMATIC 10



From Flute Mixing Preamps Q47 See Dwg. 3
.0082
39K
From Rhythm Output Amp Q200 Pt. GM See Dwg. 9
.0068
330K
From Bass Filter IC35B See Dwg. 7
.0047
100K
From Main Mixing Preamp Q74 See Dwg. 6
.0068
39K
From Phase 3 Output Amp. Q236 See Dwg. 14
.01
100K
From Phase 2 Output Amp. Q228 See Dwg. 14
.01
100K
Components Located On R/S Q.C. Board See Note 8
REVERB
150P
180K
+8V
IC33C
REVERB DRIVER
4.7K
D188
68Ω
1
EZ
Reverb Spring Unit
EW
.12
10K
1K
22K
68K
Q123
.0047
2.2K
+11V
22K
22K
REVERB RECOVERY AMPS
180K
Q124
+11V
47K
4.7K
Q125
500P
EY
3.9K
10K
EX
10K
Reverb Length Control VR19
.033
From Main Mixing Preamp Q74, Bass Filter IC35B, & Rhythm Output Amp Q200 See Dwgs. 6,7 & 9 Respectively
+16V
1K
1K
1K
1K
100
+16V
IC39
MAIN VOLUME REGULATOR
22K
6.8K
.22
15K
MAIN OUTPUT AMP
+15.5V
68K
6.8K
Q127
+15.5V
4.7K
470Ω
From Bass Filter IC35B See Dwg. 7
EXPRESSION PEDAL PHOTOCELL
-14V
P2
VOLUME REGULATOR DRIVER
+18V
Q126
18V
680Ω
EN
4.7K
25K
Maximum Organ Volume Adj. VR20
500K
Minimum Organ Volume Adj. VR21
EL
10K
D182
D183
6.8K
220Ω
EM
15K
6.8K
.22
From Flute Mixing Preamp Q47, Bass Filter IC35B, & Rhythm Output Amp Q200 See Dwgs. 6,7 & 9 Respectively
1K
1K
LESLIE VOLUME REGULATOR
+12V
IC40
27K
5.6
+15.5V
+15.5V
47K
Q128
4.7K
6.8K
1K
LESLIE OUTPUT AMP
+12V
1K
10K
100
1K
Components Located on Flute QC Board See Note 8
Components Located On Chorus Modulator Board See Note 8
+18.5V
1K
10K
1K
22K
330Ω
330Ω
100
+18.5V
IC41
PHASE 2 VOLUME REGULATOR
47K
6.8K
.22
15K
15K
6.8K
.22
22K
330Ω
PHASE 3 VOLUME REGULATOR
+18.5V
330Ω
IC42
47K
+18.5V
1K
10K
100
1K

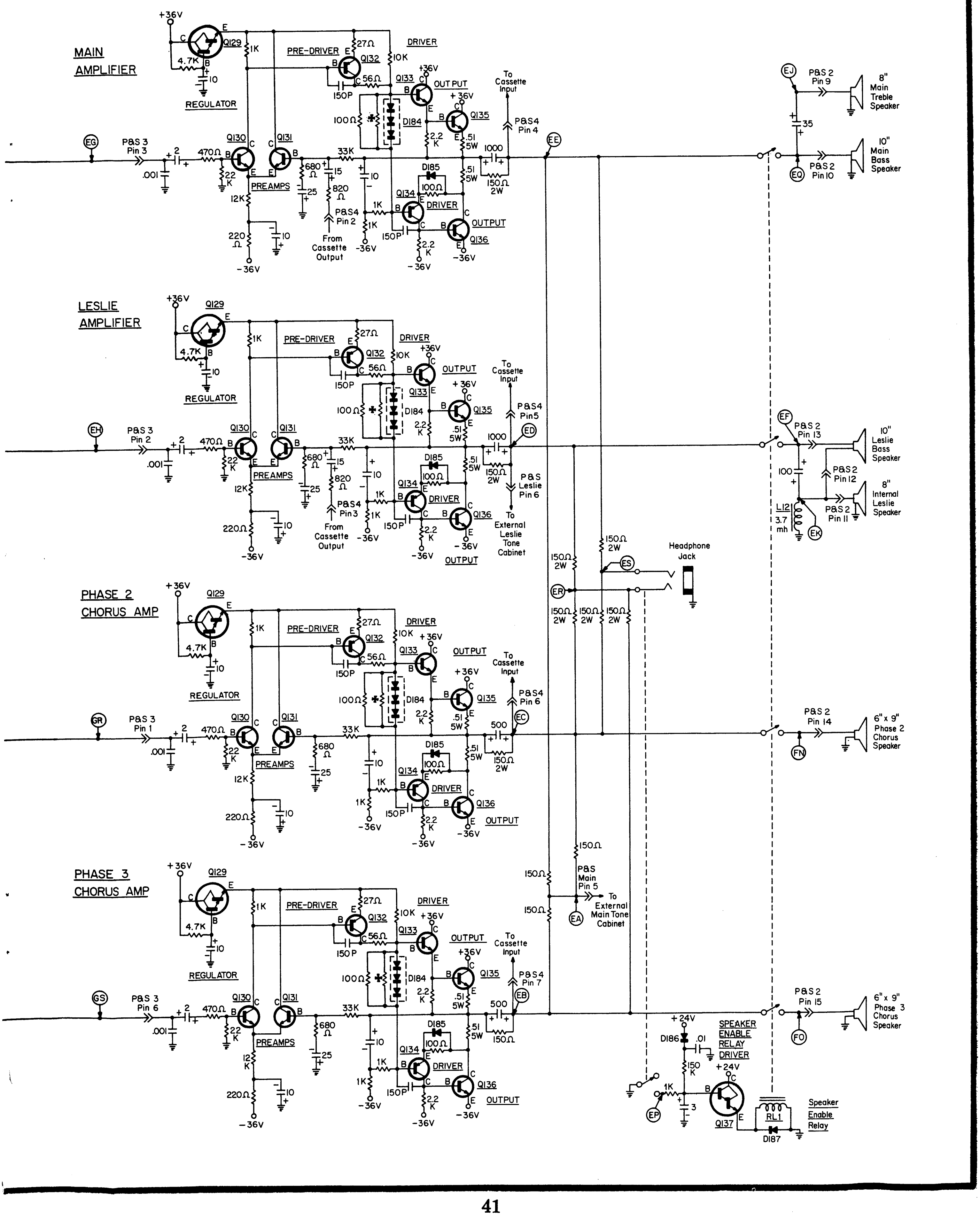
NOTES

1. All Resistors are 1/2 watt 10% unless otherwise specified
2. All Capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Keyswitches, Tabswitches and Pushbutton Switches shown in "off" position.
6. ✚ Denotes factory tailored component.
7. Circled Letter Designations Refer to Pts. Which Are Called Out on Phantom Views.
8. All Components Located in Power Supply Chassis Unless Otherwise Specified.
9. Things You Do For Nothing Are Often The Most Rewarding.

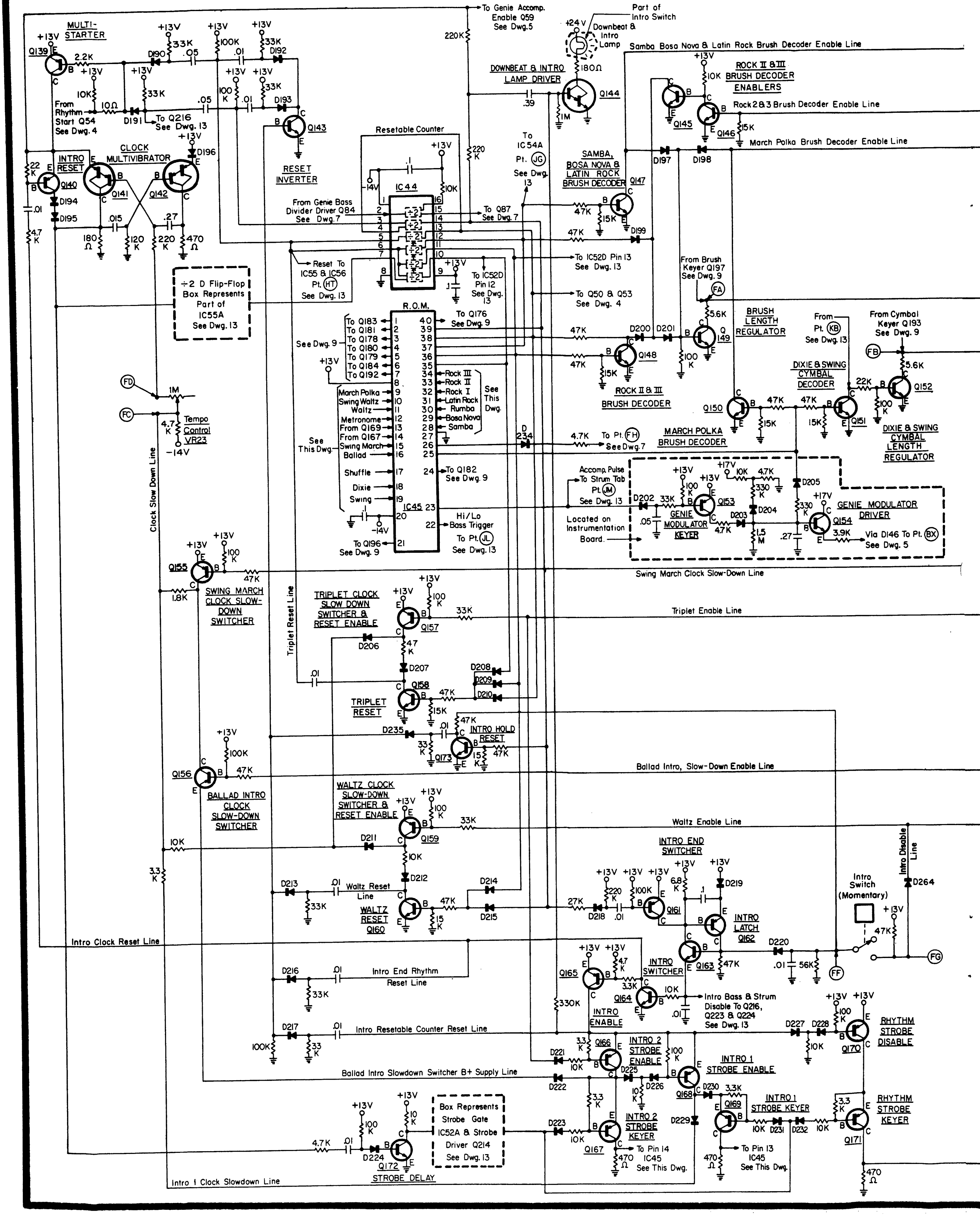
REVERB, VOLUME REGULATORS, AND AMPLIFIERS

Dwg. No. 10 Model TGS-1

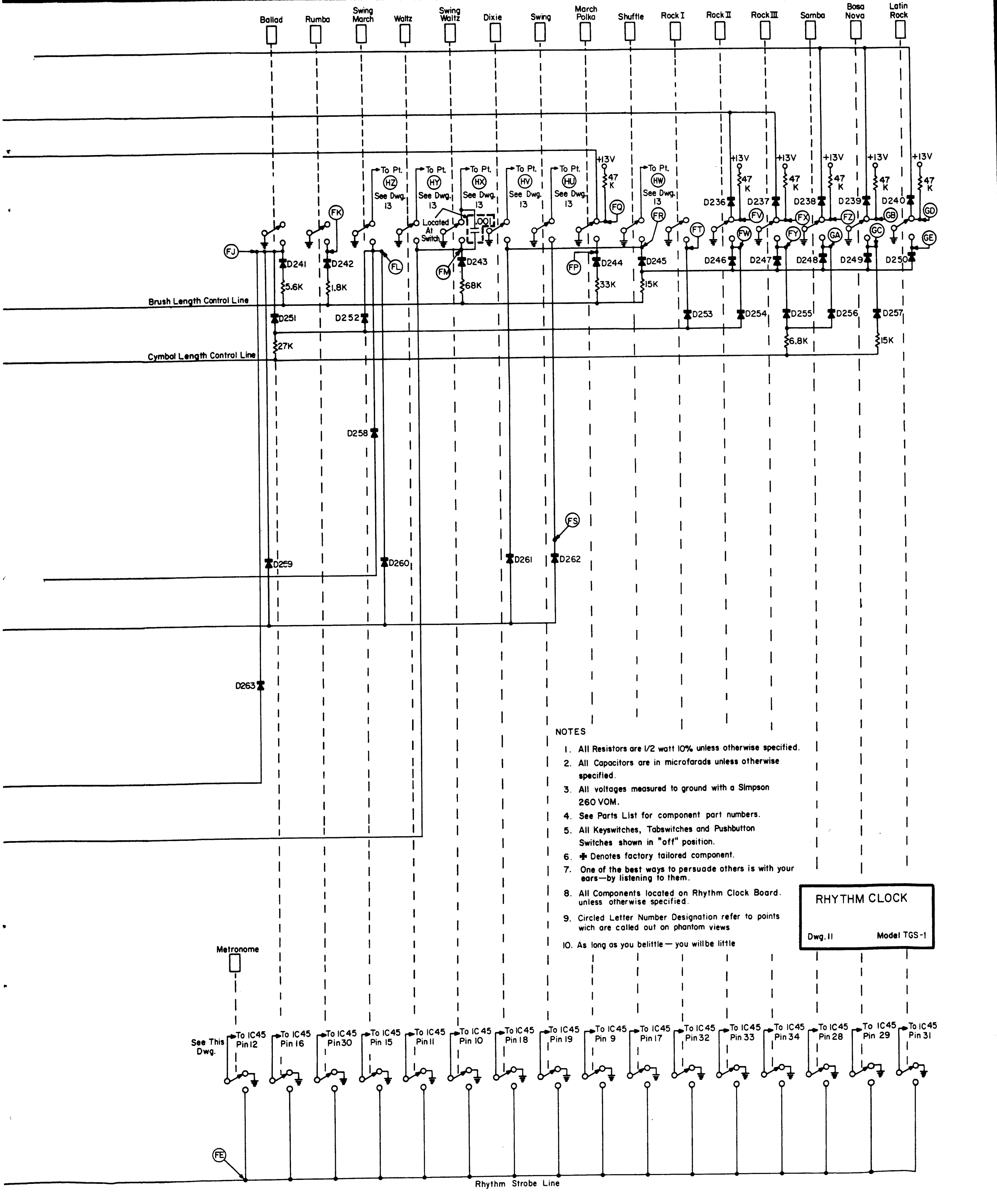
SCHEMATIC 10


MAIN AMPLIFIER
+36V
Q129
4.7K
10
REGULATOR
1K
PRE-DRIVER
27Ω
Q132
10K
DRIVER
56Ω
150P
Q133
+36V
OUTPUT
100Ω
D184
Q135
2.2 K
.51 5W
To Cassette Input
P&S4 Pin 4
EG
P&S 3 Pin 3
.001
2
470Ω
22 K
Q130
Q131
PREAMPS
12K
220 Ω
10
-36V
33K
680 Ω
15
25
820 Ω
P&S4 Pin 2
From Cassette Output
1K
D185
Q134
DRIVER
OUTPUT
Q136
150P
1000
150Ω 2W
EE
EJ
P&S 2 Pin 9
35
8" Main Treble Speaker
10" Main Bass Speaker
EQ
P&S 2 Pin 10
LESLIE AMPLIFIER
EH
P&S 3 Pin 2
P&S4 Pin3
P&S4 Pin5
ED
P&S Leslie Pin 6
To External Leslie Tone Cabinet
EF
P&S 2 Pin 13
10" Leslie Bass Speaker
100
P&S 2 Pin 12
8" Internal Leslie Speaker
L12 3.7 mh
P&S 2 Pin 11
EK
150Ω 2W
Headphone Jack
ES
ER
PHASE 2 CHORUS AMP
GR
P&S 3 Pin 1
P&S4 Pin 6
EC
500
P&S 2 Pin 14
6"x 9" Phase 2 Chorus Speaker
FN
PHASE 3 CHORUS AMP
GS
P&S 3 Pin 6
P&S4 Pin 7
EB
150Ω
P&S Main Pin 5
To External Main Tone Cabinet
EA
P&S 2 Pin 15
6"x 9" Phase 3 Chorus Speaker
FO
+24V
D186
.01
SPEAKER ENABLE RELAY DRIVER
150 K
1K
3
EP
Q137
RL1
D187
Speaker Enable Relay

SCHEMATIC 11


MULTI-STARTER
+13V
Q139
2.2K
10K
From Rhythm Start Q54 See Dwg. 4
10Ω
D190
33K
.05
100K
.01
D192
D191
To Q216 See Dwg. 13
33K
.05
100 K
.01
D193
Q143
RESET INVERTER
CLOCK MULTIVIBRATOR
INTRO RESET
D196
Q140
Q141
Q142
D194
D195
.01
4.7 K
.015
180 Ω
120 K
.27
220 K
470 Ω
÷2 D Flip-Flop Box Represents Part of IC55A See Dwg. 13
FD
FC
1M
4.7 K
Tempo Control VR23
-14V
Clock Slow Down Line
To Genie Accomp. Enable Q59 See Dwg.5
220K
Resetable Counter
-14V
IC44
10K
From Genie Bass Divider Driver Q84 See Dwg.7
Reset To IC55 & IC56 Pt. HT See Dwg. 13
To Q87 See Dwg. 7
To IC52D Pin 12 See Dwg. 13
R.O.M.
To Q183
To Q181
To Q178
To Q180
To Q179
To Q184
To Q192
See Dwg. 9
To Q176 See Dwg. 9
March Polka
Swing Waltz
Waltz
Metronome
From Q169
From Q167
Swing March
Ballad
Shuffle
Dixie
Swing
See This Dwg.
Rock III
Rock II
Rock I
Latin Rock
Rumba
Bosa Nova
Samba
See This Dwg.
To Q182 See Dwg. 9
IC45
Hi/Lo Bass Trigger To Pt. JL See Dwg. 13
To Q196 See Dwg. 9
220 K
To IC54A Pt. JG See Dwg. 13
Part of Intro Switch
+24V
Downbeat & Intro Lamp
180Ω
DOWNBEAT & INTRO LAMP DRIVER
.39
1M
Q144
Samba Bosa Nova & Latin Rock Brush Decoder Enable Line
ROCK II & III BRUSH DECODER ENABLERS
10K
Q145
Q146
15K
Rock 2 & 3 Brush Decoder Enable Line
March Polka Brush Decoder Enable Line
D197
D198
SAMBA, BOSA NOVA & LATIN ROCK BRUSH DECODER
Q147
47K
15K
D199
To IC52D Pin 13 See Dwg. 13
To Q50 & Q53 See Dwg. 4
From Brush Keyer Q197 See Dwg. 9
FA
5.6K
BRUSH LENGTH REGULATOR
Q149
D200
D201
Q148
100 K
ROCK II & III BRUSH DECODER
D234
4.7K
To Pt. FH See Dwg. 7
MARCH POLKA BRUSH DECODER
From Pt. KB See Dwg. 13
From Cymbal Keyer Q193 See Dwg. 9
FB
5.6K
DIXIE & SWING CYMBAL DECODER
22K
Q152
Q150
Q151
DIXIE & SWING CYMBAL LENGTH REGULATOR
Accomp. Pulse To Strum Tab Pt. JM See Dwg. 13
Located on Instrumentation Board.
+17V
D202
33K
Q153
GENIE MODULATOR KEYER
D203
D204
D205
1.5 M
GENIE MODULATOR DRIVER
Q154
3.9K
Via D146 To Pt. BX See Dwg. 5
Swing March Clock Slow-Down Line
Q155
47K
1.8K
SWING MARCH CLOCK SLOW-DOWN SWITCHER
Triplet Reset Line
TRIPLET CLOCK SLOW DOWN SWITCHER & RESET ENABLE
Q157
33K
Triplet Enable Line
D206
D207
D208
D209
D210
Q158
TRIPLET RESET
D235
INTRO HOLD RESET
Q173
Ballad Intro, Slow-Down Enable Line
Q156
BALLAD INTRO CLOCK SLOW-DOWN SWITCHER
WALTZ CLOCK SLOW-DOWN SWITCHER & RESET ENABLE
Q159
Waltz Enable Line
D211
D212
D213
Waltz Reset Line
D214
D215
WALTZ RESET Q160
INTRO END SWITCHER
D219
Intro Disable Line
D264
Intro Switch (Momentary)
D218
Q161
INTRO LATCH Q162
D220
56K
FF
FG
Intro Clock Reset Line
D216
Intro End Rhythm Reset Line
Q165
Q163
INTRO SWITCHER
Q164
330K
INTRO ENABLE
Intro Bass & Strum Disable To Q216, Q223 & Q224 See Dwg. 13
D217
Intro Resetable Counter Reset Line
100K
D221
Q166
INTRO 2 STROBE ENABLE
D225
D226
INTRO 1 STROBE ENABLE
Q168
D227
D228
RHYTHM STROBE DISABLE
Q170
Ballad Intro Slowdown Switcher B+ Supply Line
D222
D230
Q169
INTRO 1 STROBE KEYER
D231
D232
RHYTHM STROBE KEYER
Q171
D229
D223
Q167
INTRO 2 STROBE KEYER
To Pin 14 IC45 See This Dwg.
To Pin 13 IC45 See This Dwg.
Box Represents Strobe Gate IC52A & Strobe Driver Q214 See Dwg. 13
D224
Q172
STROBE DELAY
Intro 1 Clock Slowdown Line

SCHEMATIC 11


Ballad
Rumba
Swing March
Waltz
Swing Waltz
Dixie
Swing
March Polka
Shuffle
Rock I
Rock II
Rock III
Samba
Bosa Nova
Latin Rock
+13V
47 K
To Pt. HZ See Dwg. 13
To Pt. HY See Dwg. 13
To Pt. HX See Dwg. 13
To Pt. HV See Dwg. 13
To Pt. HU See Dwg. 13
To Pt. HW See Dwg. 13
Located At Switch
.001
FJ
FK
FL
FM
FP
FQ
FR
FT
FV
FW
FX
FY
FZ
GA
GB
GC
GD
GE
FS
FE
D236
D237
D238
D239
D240
D241
D242
D243
D244
D245
D246
D247
D248
D249
D250
D251
D252
D253
D254
D255
D256
D257
D258
D259
D260
D261
D262
D263
5.6K
1.8K
68K
33K
15K
27K
6.8K
15K
Brush Length Control Line
Cymbal Length Control Line
Metronome
See This Dwg.
To IC45 Pin 12
To IC45 Pin 16
To IC45 Pin 30
To IC45 Pin 15
To IC45 Pin 11
To IC45 Pin 10
To IC45 Pin 18
To IC45 Pin 19
To IC45 Pin 9
To IC45 Pin 17
To IC45 Pin 32
To IC45 Pin 33
To IC45 Pin 34
To IC45 Pin 28
To IC45 Pin 29
To IC45 Pin 31
Rhythm Strobe Line

NOTES

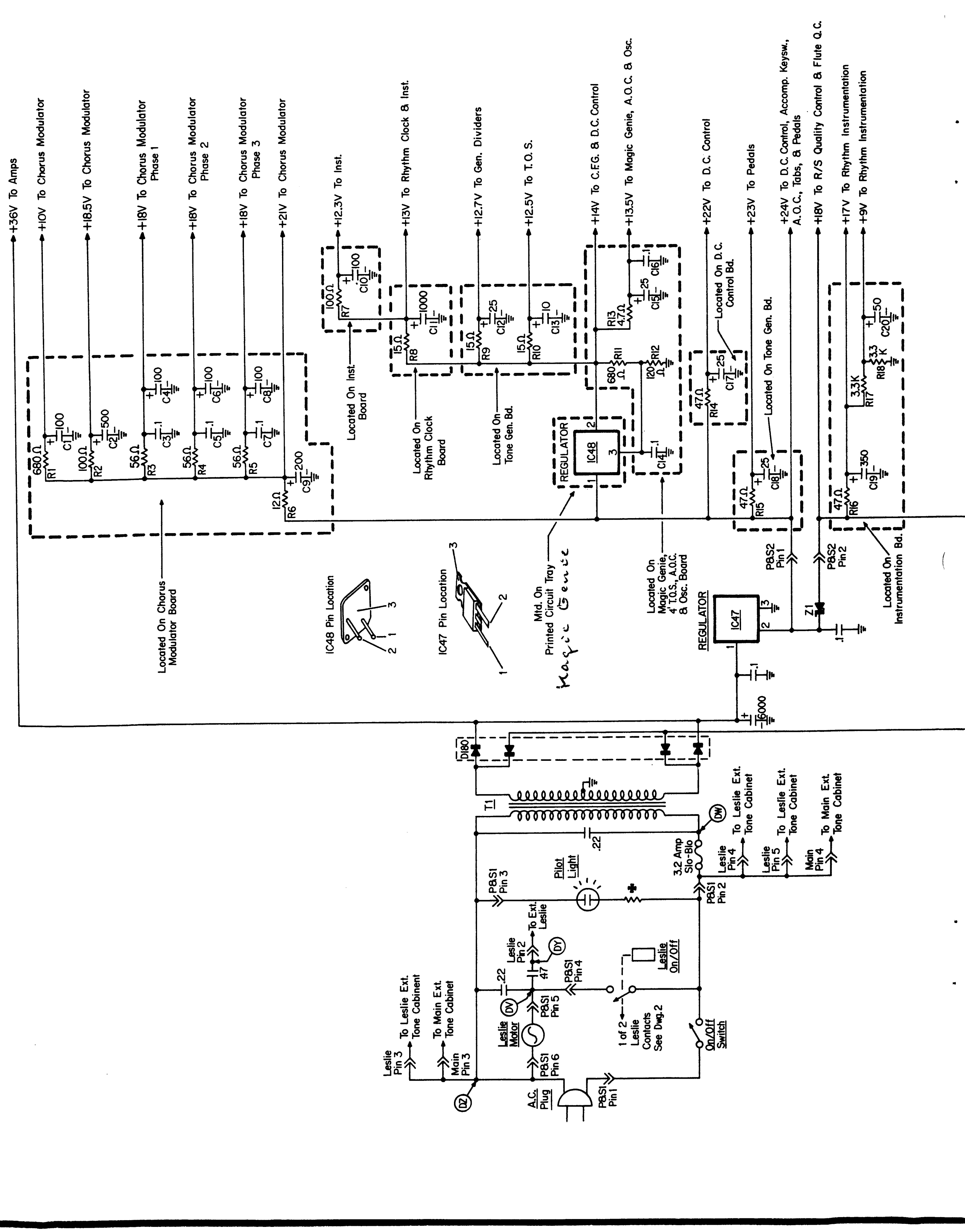
1. All Resistors are 1/2 watt 10% unless otherwise specified.
2. All Capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Keyswitches, Tabswitches and Pushbutton Switches shown in "off" position.
6. ✚ Denotes factory tailored component.
7. One of the best ways to persuade others is with your ears—by listening to them.
8. All Components located on Rhythm Clock Board. unless otherwise specified.
9. Circled Letter Number Designation refer to points wich are called out on phantom views
10. As long as you belittle — you willbe little

RHYTHM CLOCK

Dwg. 11

Model TGS-1

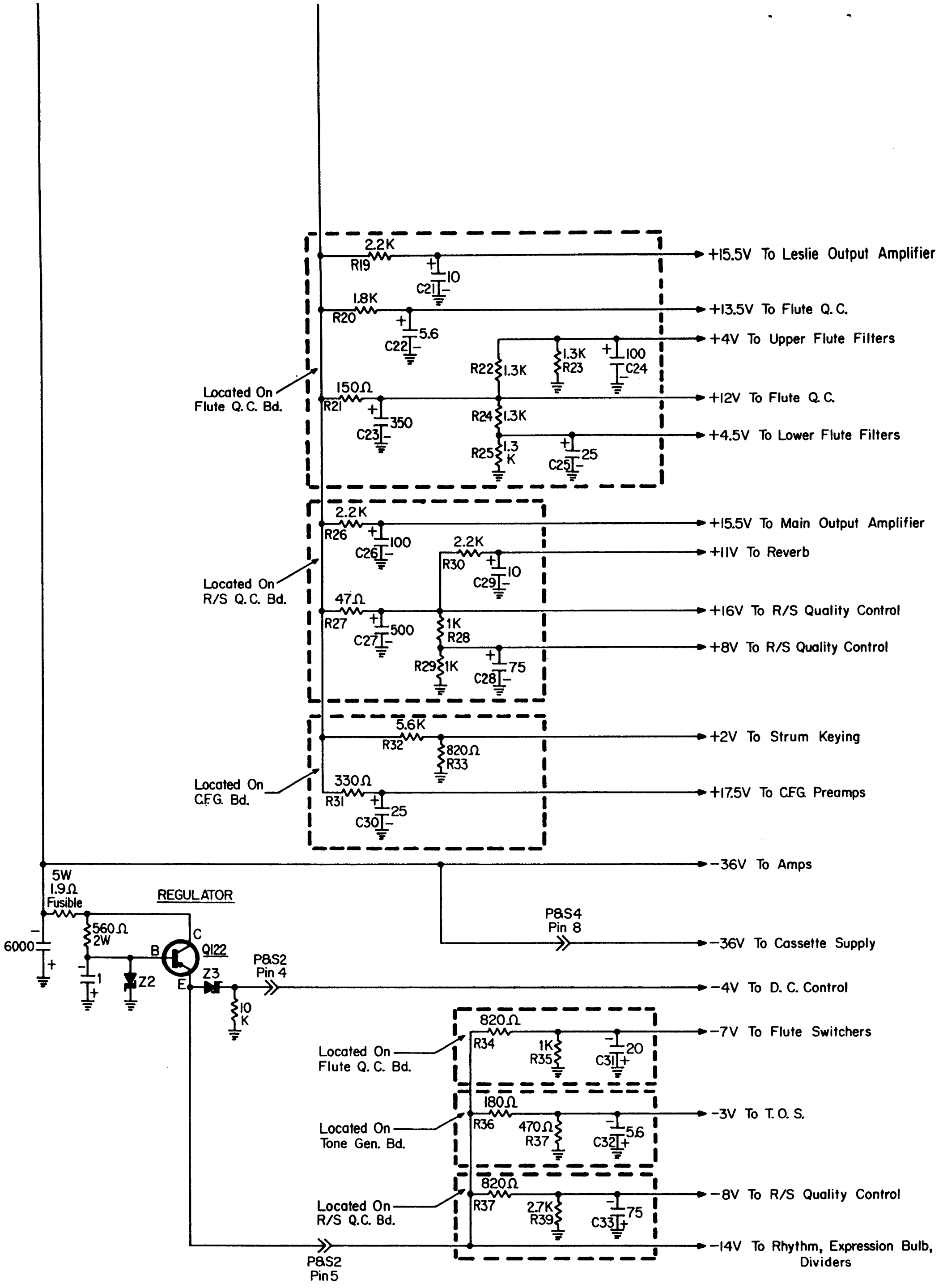
SCHEMATIC 12


+36V To Amps
+10V To Chorus Modulator
+18.5V To Chorus Modulator
+18V To Chorus Modulator Phase 1
+18V To Chorus Modulator Phase 2
+18V To Chorus Modulator Phase 3
+21V To Chorus Modulator
+12.3V To Inst.
+13V To Rhythm Clock & Inst.
+12.7V To Gen. Dividers
+12.5V To T.O.S.
+14V To C.F.G. & D.C. Control
+13.5V To Magic Genie, A.O.C. & Osc.
+22V To D.C. Control
+23V To Pedals
+24V To D.C. Control, Accomp. Keysw., A.O.C., Tabs, & Pedals
+18V To R/S Quality Control & Flute Q.C.
+17V To Rhythm Instrumentation
+9V To Rhythm Instrumentation
R1 680Ω
C1 100
R2 100Ω
C2 500
R3 56Ω
C3 .1
C4 100
R4 56Ω
C5 .1
C6 100
R5 56Ω
C7 .1
C8 100
R6 12Ω
C9 200
Located On Chorus Modulator Board
R7 100Ω
C10 100
Located On Inst. Board
R8 15Ω
C11 1000
Located On Rhythm Clock Board
R9 15Ω
C12 25
R10 15Ω
C13 10
Located On Tone Gen. Bd.
R11 680Ω
R12 120Ω
R13 4.7Ω
C15 25
C16 .1
C14 .1
REGULATOR IC48
1 2 3
Located On Magic Genie, 4' T.O.S., A.O.C. & Osc. Board
Mtd. On Printed Circuit Tray
Magic Genie
R14 47Ω
C17 25
Located On D.C. Control Bd.
R15 47Ω
C18 25
Located On Tone Gen. Bd.
R16 47Ω
C19 350
R17 3.3K
R18 3.3K
C20 50
Located On Instrumentation Bd.
IC48 Pin Location
IC47 Pin Location
P8S2 Pin 1
P8S2 Pin 2
Z1
.1
REGULATOR IC47
.1
6000
D180
T1
.22
DW
3.2 Amp Slo-Blo
Leslie Pin 4 To Leslie Ext. Tone Cabinet
Leslie Pin 5 To Leslie Ext. Tone Cabinet
Main Pin 4 To Main Ext. Tone Cabinet
P8S1 Pin 3
Pilot Light
P8S1 Pin 2
Leslie Pin 2 To Ext. Leslie
DY
.22
47
P8S1 Pin 4
Leslie On/Off
DV
P8S1 Pin 5
Leslie Motor
1 of 2 Leslie Contacts See Dwg.2
On/Off Switch
Leslie Pin 3 To Leslie Ext. Tone Cabinet
Main Pin 3 To Main Ext. Tone Cabinet
P8S1 Pin 6
DZ
A.C. Plug
P8S1 Pin 1

SCHEMATIC 12

NOTES

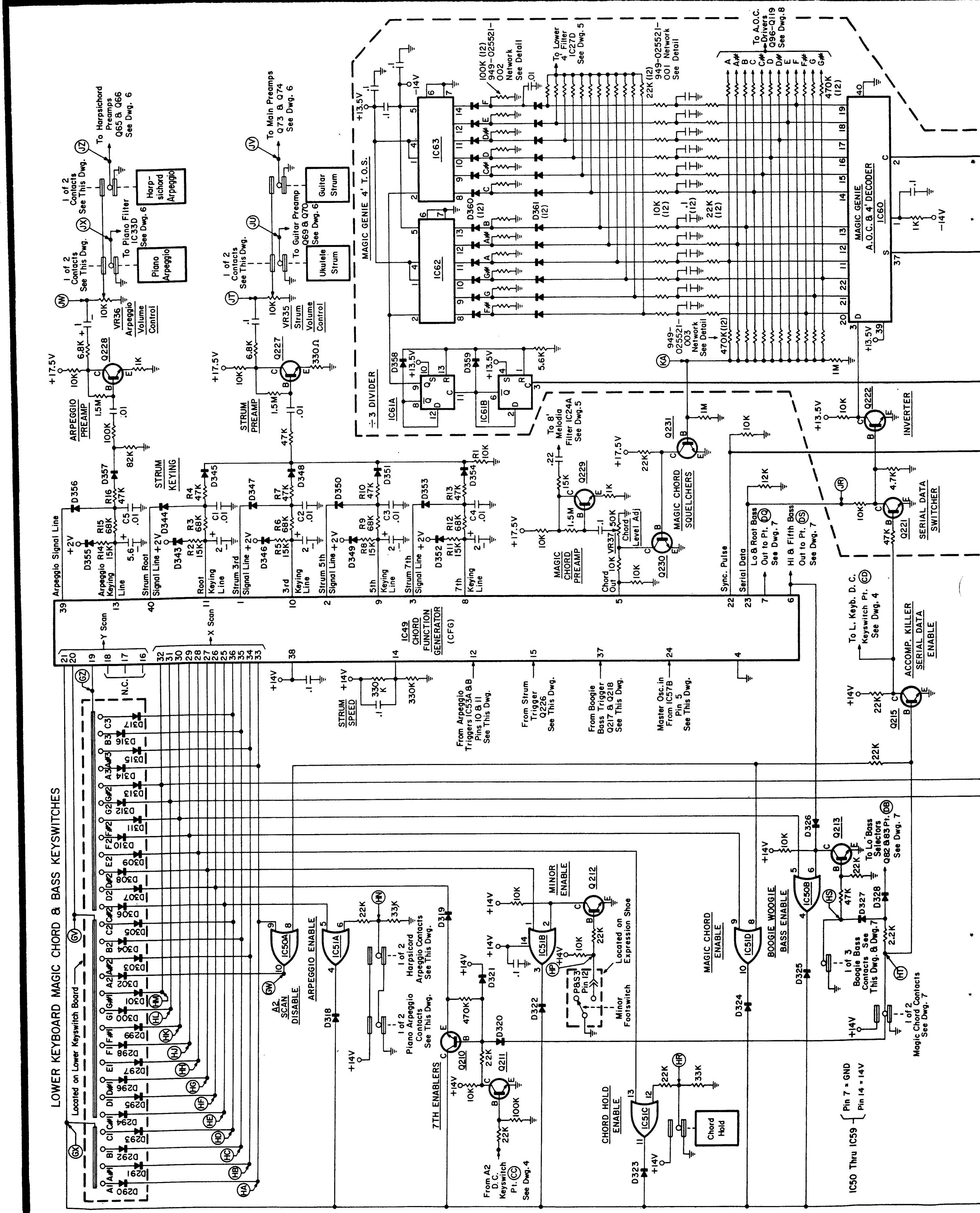
1. All Resistors are 1/2 watt 10% unless otherwise specified.
2. All Capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Keyswitches, Tabswitches and Pushbutton Switches shown in "off" position.
6. Denotes factory tailored component.
7. All Components located on Power Supply unless otherwise specified.
8. Circled Letter Designations refer to points that are called out on Phantom Views.
9. A filing cabinet is a place where things can get lost alphabetically.


2.2K
R19
C21 10
1.8K
R20
C22 5.6
R22 1.3K
1.3K R23
C24 100
150Ω
R21
C23 350
R24 1.3K
R25 1.3 K
C25 25
Located On Flute Q.C. Bd.
2.2K
R26
C26 100
2.2K
R30
C29 10
47Ω
R27
C27 500
1K R28
R29 1K
C28 75
Located On R/S Q.C. Bd.
5.6K
R32
820Ω R33
330Ω
R31
C30 25
Located On C.F.G. Bd.
5W 1.9Ω Fusible
6000
560Ω 2W
1
Z2
REGULATOR
B
C
E
Q122
Z3
P&S2 Pin 4
10 K
P&S4 Pin 8
820Ω
R34
1K R35
C31 20
Located On Flute Q.C. Bd.
180Ω
R36
470Ω R37
C32 5.6
Located On Tone Gen. Bd.
820Ω
R37
2.7K R39
C33 75
Located On R/S Q.C. Bd.
P&S2 Pin5
+15.5V To Leslie Output Amplifier
+13.5V To Flute Q.C.
+4V To Upper Flute Filters
+12V To Flute Q.C.
+4.5V To Lower Flute Filters
+15.5V To Main Output Amplifier
+11V To Reverb
+16V To R/S Quality Control
+8V To R/S Quality Control
+2V To Strum Keying
+17.5V To C.F.G. Preamps
-36V To Amps
-36V To Cassette Supply
-4V To D.C. Control
-7V To Flute Switchers
-3V To T.O.S.
-8V To R/S Quality Control
-14V To Rhythm, Expression Bulb, Dividers

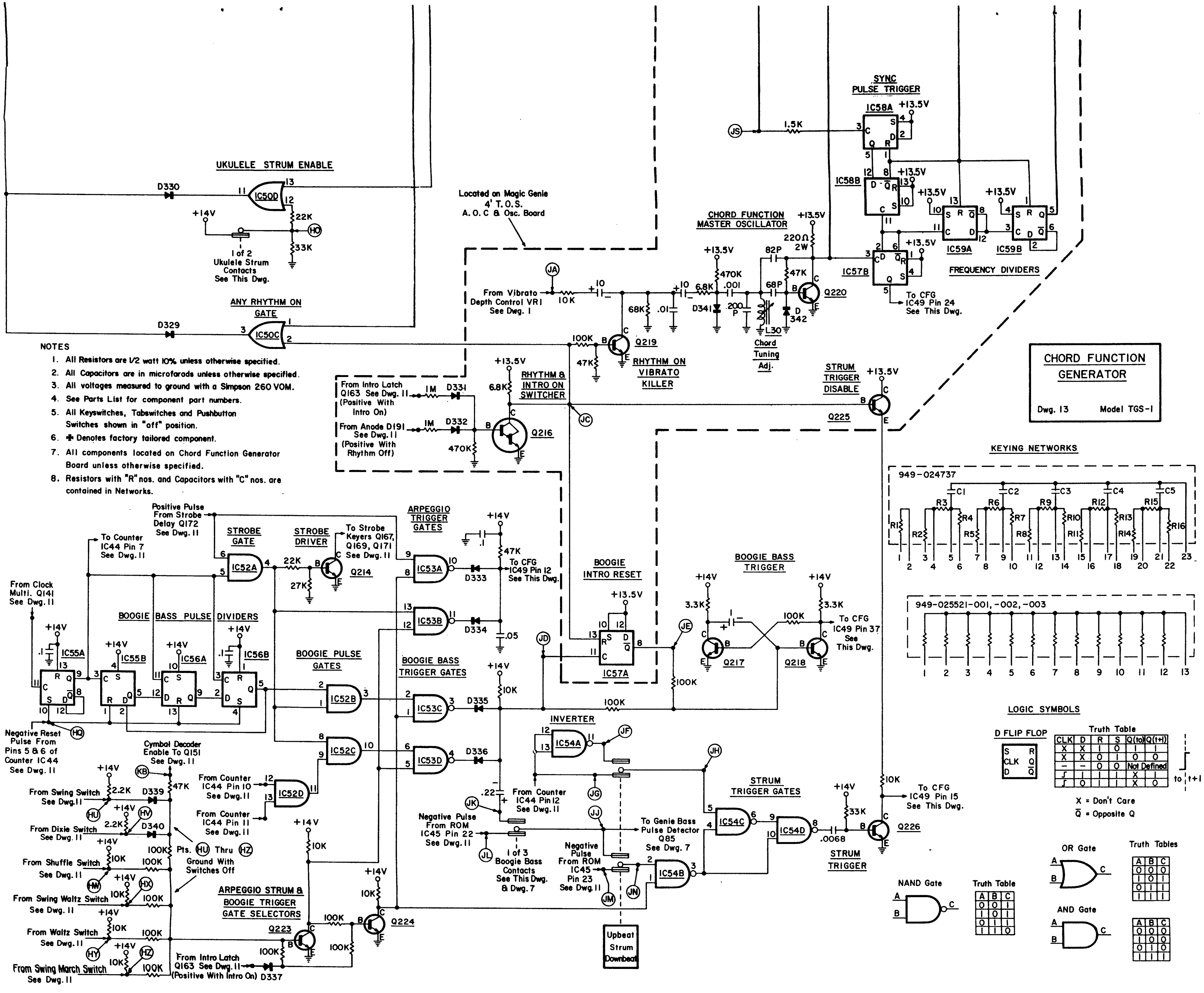
POWER SUPPLY

Dwg. No. 12 Model TGS-1

SCHEMATIC 13


LOWER KEYBOARD MAGIC CHORD & BASS KEYSWITCHES
Located on Lower Keyswitch Board
IC49 CHORD FUNCTION GENERATOR (CFG)
Y Scan
X Scan
N.C.
Arpeggio Signal Line
Arpeggio Keying Line
Strum Root Signal Line +2V
Root Keying Line
Strum 3rd Signal Line +2V
3rd Keying Line
Strum 5th Signal Line +2V
5th Keying Line
Strum 7th Signal Line +2V
7th Keying Line
STRUM KEYING
ARPEGGIO PREAMP
Q228
STRUM PREAMP
Q227
VR36 Arpeggio Volume Control
VR35 Strum Volume Control
Piano Arpeggio
Harpsichord Arpeggio
Ukulele Strum
Guitar Strum
1 of 2 Contacts See This Dwg.
To Piano Filter IC33D See Dwg. 6
To Harpsichord Preamps Q65 & Q66 See Dwg. 6
To Guitar Preamp Q69 & Q70 See Dwg. 6
To Main Preamps Q73 & Q74 See Dwg. 6
+17.5V
MAGIC GENIE 4' T.O.S.
IC62
IC63
÷3 DIVIDER
IC61A
IC61B
MAGIC GENIE A.O.C. & 4' DECODER IC60
To Lower 4' Filter IC27D See Dwg. 5
100K (12) 949-025521-002 Network See Detail
949-025521-001 Network See Detail
949-025521-003 Network See Detail
To A.O.C. Drivers Q96-Q119 See Dwg. 8
To 8' Melodia Filter IC24A See Dwg. 5
MAGIC CHORD PREAMP
Q229
VR37 Chord Level Adj
Chord Out
Q230
MAGIC CHORD SQUELCHERS
Q231
Sync. Pulse
Serial Data
Lo & Root Bass Out to Pt. DQ See Dwg. 7
Hi & Fifth Bass Out to Pt. DS See Dwg. 7
INVERTER
Q222
SERIAL DATA SWITCHER
Q221
To L. Keyb. D. C. Keyswitch Pt. CD See Dwg. 4
ACCOMP. KILLER SERIAL DATA ENABLE
Q215
STRUM SPEED
From Arpeggio Triggers IC53A & B Pins 10 & 11 See This Dwg.
From Strum Trigger Q226 See This Dwg.
From Boogie Bass Trigger Q217 & Q218 See This Dwg.
Master Osc. in From IC57B Pin 5 See This Dwg.
A2 SCAN DISABLE
IC50A
ARPEGGIO ENABLE
IC51A
1 of 2 Harpsichord Arpeggio Contacts See This Dwg.
1 of 2 Piano Arpeggio Contacts See This Dwg.
7TH ENABLERS
Q210
Q211
From A2 D.C. Keyswitch Pt. CC See Dwg. 4
MINOR ENABLE
Q212
IC51B
Located on Expression Shoe
PBS3 Pin 12
Minor Footswitch
CHORD HOLD ENABLE
IC51C
Chord Hold
MAGIC CHORD ENABLE
IC51D
BOOGIE WOOGIE BASS ENABLE
IC50B
Q213
To Lo Bass Selectors Q82 & 83 Pt. DB See Dwg. 7
1 of 3 Boogie Bass Contacts See This Dwg. & Dwg. 7
1 of 2 Magic Chord Contacts See Dwg. 7
IC50 Thru IC59 { Pin 7 = GND, Pin 14 = +14V

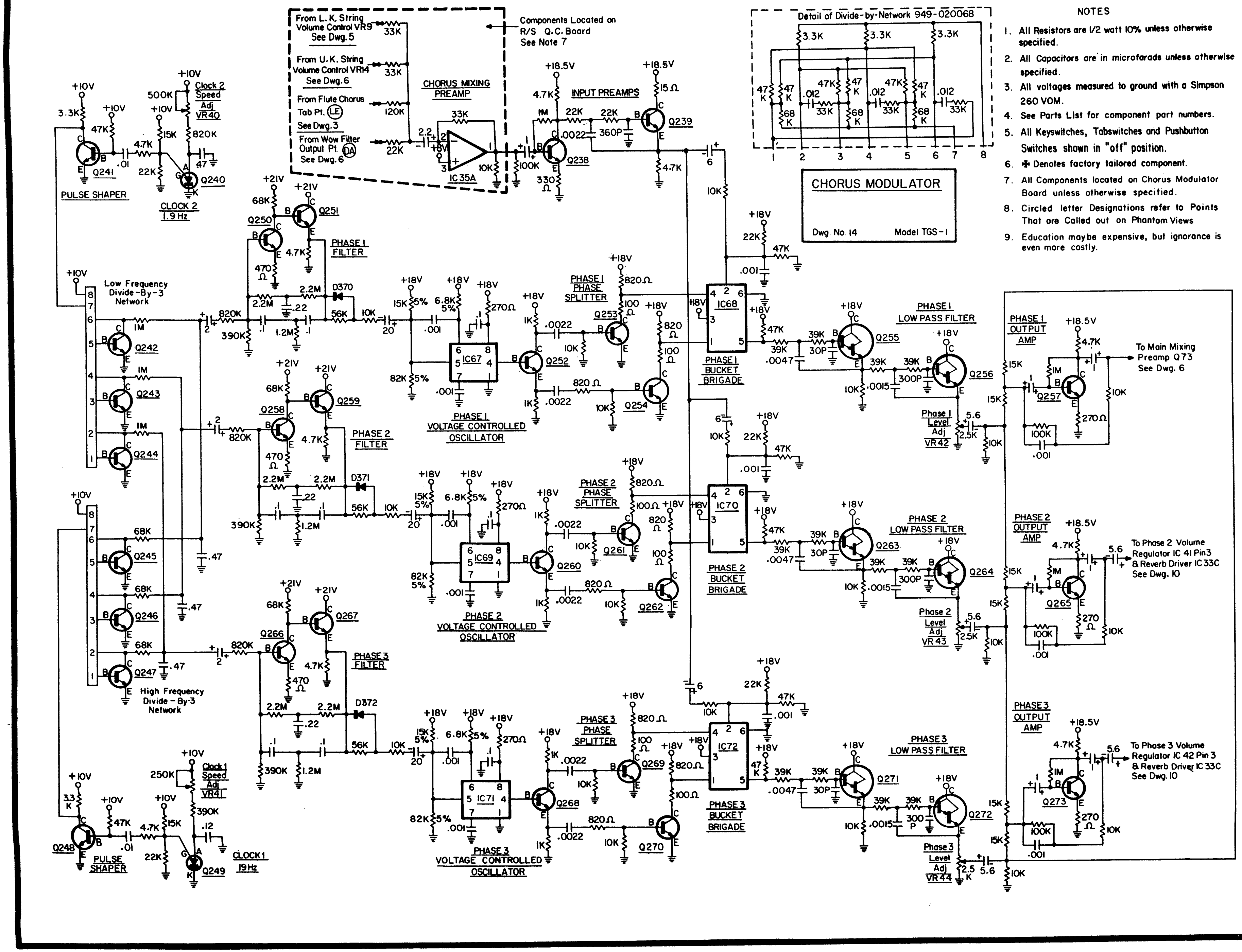
SCHEMATIC 13


CHORD FUNCTION GENERATOR
Dwg. 13
Model TGS-1
UKULELE STRUM ENABLE
IC50D
D330
+14V
22K
33K
HO
1 of 2 Ukulele Strum Contacts See This Dwg.
ANY RHYTHM ON GATE
IC50C
D329
Located on Magic Genie 4' T.O.S. A.O.C & Osc. Board
JA
From Vibrato Depth Control VR1 See Dwg. 1
10K
10
68K
.01
100K
47K
Q219
RHYTHM ON VIBRATO KILLER
CHORD FUNCTION MASTER OSCILLATOR
+13.5V
220Ω 2W
470K
6.8K
.001
.200 P
D341
82P
68P
47K
L30
Chord Tuning Adj.
Q220
D 342
SYNC PULSE TRIGGER
IC58A
IC58B
IC59A
IC59B
IC57B
JS
1.5K
To CFG IC49 Pin 24 See This Dwg.
FREQUENCY DIVIDERS
STRUM TRIGGER DISABLE
Q225
From Intro Latch Q163 See Dwg. 11 (Positive With Intro On)
From Anode D191 See Dwg. 11 (Positive With Rhythm Off)
1M
D331
D332
470K
6.8K
RHYTHM & INTRO ON SWITCHER
Q216
JC
KEYING NETWORKS
949-024737
C1 C2 C3 C4 C5
R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16
949-025521-001, -002, -003
BOOGIE INTRO RESET
IC57A
JD
JE
BOOGIE BASS TRIGGER
+14V
3.3K
100K
Q217
Q218
To CFG IC49 Pin 37 See This Dwg.
Positive Pulse From Strobe Delay Q172 See Dwg. 11
To Counter IC44 Pin 7 See Dwg. 11
STROBE GATE
IC52A
22K
27K
STROBE DRIVER
Q214
To Strobe Keyers Q167, Q169, Q171 See Dwg. 11
ARPEGGIO TRIGGER GATES
IC53A
IC53B
D333
D334
To CFG IC49 Pin 12 See This Dwg.
.05
From Clock Multi. Q141 See Dwg. 11
BOOGIE BASS PULSE DIVIDERS
IC55A
IC55B
IC56A
IC56B
BOOGIE PULSE GATES
IC52B
IC52C
IC52D
BOOGIE BASS TRIGGER GATES
IC53C
IC53D
D335
D336
10K
Negative Reset Pulse From Pins 5 & 6 of Counter IC44 See Dwg. 11
Cymbal Decoder Enable To Q151 See Dwg. 11
KB
From Swing Switch See Dwg. 11
From Dixie Switch See Dwg. 11
From Shuffle Switch See Dwg. 11
From Swing Waltz Switch See Dwg. 11
From Waltz Switch See Dwg. 11
From Swing March Switch See Dwg. 11
HU
HV
HW
HX
HY
HZ
D339
D340
2.2K
Pts. HU Thru HZ Ground With Switches Off
From Counter IC44 Pin 10 See Dwg. 11
From Counter IC44 Pin 11 See Dwg. 11
ARPEGGIO STRUM & BOOGIE TRIGGER GATE SELECTORS
Q223
Q224
From Intro Latch Q163 See Dwg. 11 (Positive With Intro On) D337
INVERTER
IC54A
JF
JG
From Counter IC44 Pin 12 See Dwg. 11
JK
.22
Negative Pulse From ROM IC45 Pin 22 See Dwg. 11
JL
1 of 3 Boogie Bass Contacts See This Dwg. & Dwg. 7
JJ
To Genie Bass Pulse Detector Q85 See Dwg. 7
Negative Pulse From ROM IC45 Pin 23 See Dwg. 11
JM
JN
Upbeat Strum Downbeat
IC54B
JH
STRUM TRIGGER GATES
IC54C
IC54D
.0068
33K
Q226
STRUM TRIGGER
To CFG IC49 Pin 15 See This Dwg.
LOGIC SYMBOLS
D FLIP FLOP
Truth Table
CLK D R S Q(tn) Q(t+1)
X = Don't Care
Q̄ = Opposite Q
to t+1
OR Gate
AND Gate
NAND Gate
Truth Tables
A B C

NOTES

1. All Resistors are 1/2 watt 10% unless otherwise specified.
2. All Capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Keyswitches, Tabswitches and Pushbutton Switches shown in "off" position.
6. ✚ Denotes factory tailored component.
7. All components located on Chord Function Generator Board unless otherwise specified.
8. Resistors with "R" nos. and Capacitors with "C" nos. are contained in Networks.

SCHEMATIC 14


CHORUS MODULATOR
Dwg. No. 14
Model TGS-1
Detail of Divide-by-Network 949-020068
Components Located on R/S Q.C. Board See Note 7
From L.K. String Volume Control VR9 See Dwg.5
From U.K. String Volume Control VR14 See Dwg.6
From Flute Chorus Tab Pt. LE See Dwg.3
From Wow Filter Output Pt. DA See Dwg.6
CHORUS MIXING PREAMP
IC35A
INPUT PREAMPS
Q238
Q239
PULSE SHAPER
Q241
Clock 2 Speed Adj VR40
CLOCK 2 1.9 Hz
Q240
Low Frequency Divide-By-3 Network
Q242
Q243
Q244
High Frequency Divide-By-3 Network
Q245
Q246
Q247
Clock1 Speed Adj VR41
CLOCK1 19Hz
Q248
Q249
PHASE 1 FILTER
Q250
Q251
D370
PHASE 2 FILTER
Q258
Q259
D371
PHASE 3 FILTER
Q266
Q267
D372
PHASE 1 VOLTAGE CONTROLLED OSCILLATOR
IC67
PHASE 2 VOLTAGE CONTROLLED OSCILLATOR
IC69
PHASE 3 VOLTAGE CONTROLLED OSCILLATOR
IC71
PHASE 1 PHASE SPLITTER
Q252
Q253
Q254
PHASE 2 PHASE SPLITTER
Q260
Q261
Q262
PHASE 3 PHASE SPLITTER
Q268
Q269
Q270
PHASE 1 BUCKET BRIGADE
IC68
PHASE 2 BUCKET BRIGADE
IC70
PHASE 3 BUCKET BRIGADE
IC72
PHASE 1 LOW PASS FILTER
Q255
Q256
PHASE 2 LOW PASS FILTER
Q263
Q264
PHASE 3 LOW PASS FILTER
Q271
Q272
Phase 1 Level Adj VR42
Phase 2 Level Adj VR43
Phase 3 Level Adj VR44
PHASE 1 OUTPUT AMP
Q257
PHASE 2 OUTPUT AMP
Q265
PHASE 3 OUTPUT AMP
Q273
To Main Mixing Preamp Q73 See Dwg. 6
To Phase 2 Volume Regulator IC 41 Pin3 & Reverb Driver IC33C See Dwg. 10
To Phase 3 Volume Regulator IC 42 Pin 3 & Reverb Driver IC 33C See Dwg. 10
+18.5V
+18V
+21V
+10V

NOTES

1. All Resistors are 1/2 watt 10% unless otherwise specified.
2. All Capacitors are in microfarads unless otherwise specified.
3. All voltages measured to ground with a Simpson 260 VOM.
4. See Parts List for component part numbers.
5. All Keyswitches, Tabswitches and Pushbutton Switches shown in "off" position.
6. ✱ Denotes factory tailored component.
7. All Components located on Chorus Modulator Board unless otherwise specified.
8. Circled letter Designations refer to Points That are Called out on Phantom Views
9. Education maybe expensive, but ignorance is even more costly.

TRANSISTOR BASING DIAGRAM

FIG. A

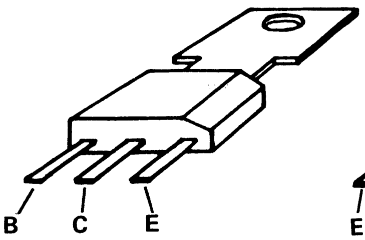


FIG. B

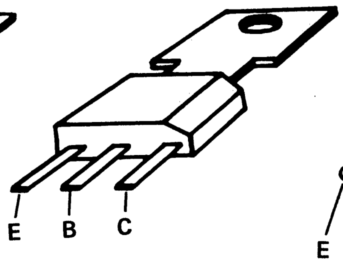


FIG. C

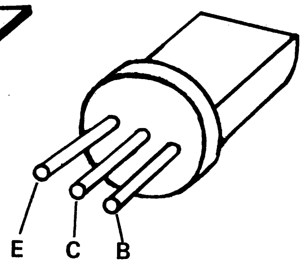


FIG. D

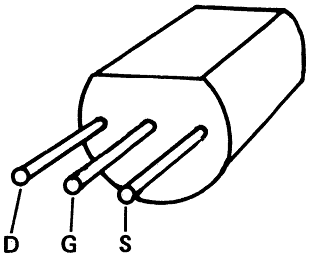


FIG. E

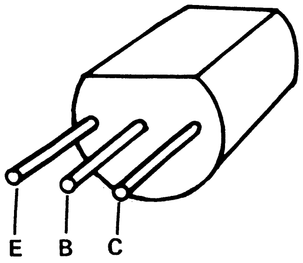


FIG. F

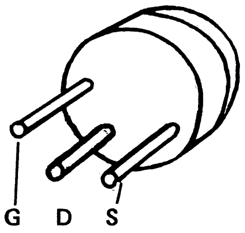


FIG. G

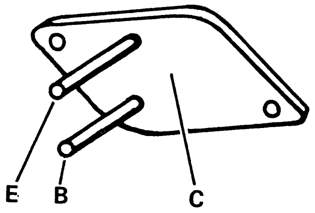


FIG. H

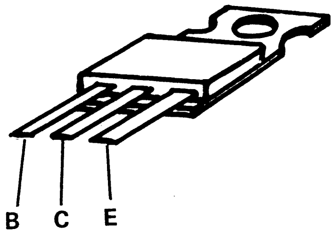


FIG. J

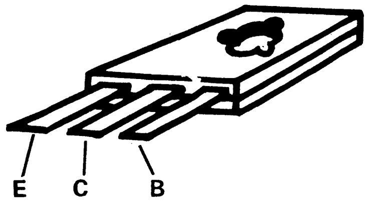


FIG. K

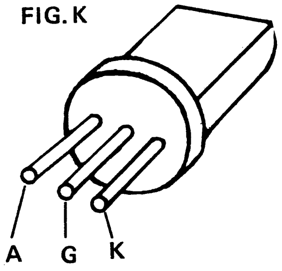


FIG. L

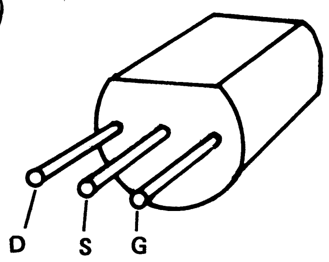
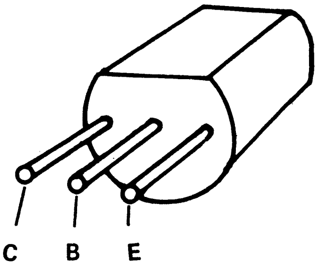


FIG. M



PART NUMBER	FIGURE	PART NUMBER	FIGURE	PART NUMBER	FIGURE	PART NUMBER	FIGURE
992-001192	G	991-012328	F	991-016727	C	992-024185	G
991-002232	C	991-012396	F	991-016788	C	991-024184	C
991-002271	G	991-012686	F	992-017169	G	991-025535	M
991-002298	C	992-013170	A	991-017456	F		
991-002356	C	991-013543	C	991-018238	C		
991-002873	C	991-013544	C	991-018047	E		
991-002888	C	991-013599	C	991-018237	B		
992-003139	G	991-015000	A	991-018493	E		
991-003304	C	991-015001	A	992-020432	G		
991-008393	C	991-015062	A	991-020425	H		
991-008394	C	991-015063	A	991-020426	H		
992-008890	G	991-015316	K	992-022201	G		
991-010098	C	991-015587	C	991-021451	J		
991-010462	C	991-015614	C	991-021450	J		
991-011576	D	991-015663	C	992-022773	G		
991-011706	D	991-016274	C	991-022774	L		

CHARTS

UPPER KEYBOARD FREQUENCY DISTRIBUTION CHART

FREQUENCY OCTAVE in Hertz	2′ VOICES	4′ VOICES	8′ VOICES	16′ VOICES	2-2/3′ VOICES	5-1/3′ VOICES
F8-5587					A#4	
F7-2793	F3	F4			A#3	A#4
F6-1396	F2	F3	F4		A#2	A#3
F5-698	F1	F2	F3	F4	A#1	A#2
F4-349		F1	F2	F3		A#1
F3-174			F1	F2		
F2-87				F1		
F#8-5919	F#4				B4	
F#7-2960	F#3	F#4			B3	B4
F#6-1480	F#2	F#3	F#4		B2	B3
F#5-739	F#1	F#2	F#3	F#4	B1	B2
F#4-369		F#1	F#2	F#3		B1
F#3-185			F#1	F#2		
F#2-92				F#1		
G8-6271	G4				C4	
G7-3136	G3	G4			C3	C4
G6-1568	G2	G3	G4		C2	C3
G5-783	G1	G2	G3	G4	C1	C2
G4-392		G1	G2	G3		C1
G3-196			G1	G2		
G2-97				G1		
G#8-6644	G#4					
G#7-3322	G#3	G#4			C#3	
G#6-1661	G#2	G#3	G#4		C#2	C#3
G#5-830	G#1	G#2	G#3	G#4	C#1	C#2
G#4-415		G#1	G#2	G#3		C#1
G#3-207			G#1	G#2		
G#2-103				G#1		
A8-7040	A4					
A7-3520	A3	A4			D3	
A6-1760	A2	A3	A4		D2	D3
A5-880	A1	A2	A3	A4	D1	D2
A4-440		A1	A2	A3		D1
A3-220			A1	A2		
A2-110				A1		
A#8-7458	A#4					
A#7-3729	A#3	A#4			D#3	
A#6-1864	A#2	A#3	A#4		D#2	D#3
A#5-932	A#1	A#2	A#3	A#4	D#1	D#2
A#4-466		A#1	A#2	A#3		D#1

UPPER KEYBOARD FREQUENCY DISTRIBUTION CHART (Continued)

FREQUENCY OCTAVE in Hertz	2′ VOICES	4′ VOICES	8′ VOICES	16′ VOICES	2-2/3′ VOICES	5-1/3′ VOICES
A#3-233			A#1	A#2		
A#2-116				A#1		
B8-7902	B4					
B7-3951	B3	B4			E3	
B6-1975	B2	B3	B4		E2	E3
B5-987	B1	B2	B3	B4	E1	E2
B4-493		B1	B2	B3		E1
B3-246			B1	B2		
B2-123				B1		
C9-8372	C4					
C8-4186	C3	C4			F4	
C7-2093	C2	C3	C4		F3	F4
C6-1046	C1	C2	C3	C4	F2	F3
C5-523		C1	C2	C3	F1	F2
C4-261			C1	C2		F1
C3-130				C1		
C#8-4434	C#3				F#4	
C#7-2217	C#2	C#3			F#3	F#4
C#6-1108	C#1	C#2	C#3		F#2	F#3
C#5-554		C#1	C#2	C#3	F#1	F#2
C#4-277			C#1	C#2		F#1
C#3-138				C#1		
D8-4698	D3				G4	
D7-2349	D2	D3			G3	G4
D6-1174	D1	D2	D3		G2	G3
D5-587		D1	D2	D3	G1	G2
D4-293			D1	D2		G1
D3-146				D1		
D#8-4978	D#3				G#4	
D#7-2489	D#2	D#3			G#3	G#4
D#6-1244	D#1	D#2	D#3		G#2	G#3
D#5-622		D#1	D#2	D#3	G#1	G#2
D#4-311			D#1	D#2		G#1
D#3-155				D#1		
E8-5274	E3				A4	
E7-2637	E2	E3			A3	A4
E6-1318	E1	E2	E3		A2	A3
E5-659		E1	E2	E3	A1	A2
E4-329			E1	E2		A1
E3-164				E1		

CHARTS

LOWER KEYBOARD FREQUENCY CHART

FREQUENCY OCTAVE in Hertz	4′ VOICES	8′ VOICES	FREQUENCY OCTAVE in Hertz	4′ VOICES	8′ VOICES
A6-1760	A4		D4-293	D1	D2
A5-880	A3	A4	D3-146		D1
A4-440	A2	A3	D#7-2489	D#4	
A3-220	A1	A2	D#6-1244	D#3	D#4
A2-110		A1	D#5-622	D#2	D#3
A#6-1864	A#4		D#4-311	D#1	D#2
A#5-932	A#3	A#4	D#3-155		D#1
A#4-466	A#2	A#3	E7-2637	E4	
A#3-233	A#1	A#2	E6-1318	E3	E4
A#2-166		A#1	E5-659	E2	E3
B6-1975	B4		E4-329	E1	E2
B5-987	B3	B4	E3-146		E1
B4-493	B2	B3	F6-1396	F3	
B3-246	B1	B2	F5-698	F2	F3
B2-123		B1	F4-349	F1	F2
C7-2093	C4		F3-164		F1
C6-1046	C3	C4	F#6-1480	F#3	
C5-523	C2	C3	F#5-740	F#2	F#3
C4-261	C1	C2	F#4-369	F#1	F#2
C3-130		C1	F#3-185		F#1
C#7-2217	C#4		G6-1568	G3	
C#6-1108	C#3	C#4	G5-783	G2	G3
C#5-523	C#2	C#3	G4-392	G1	G2
C#4-277	C#1	C#2	G3-196		G1
C#3-138		C#1	G#6-1661	G#3	
D7-2349	D4		G#5-830	G#2	G#3
D6-1174	D3	D4	G#4-415	G#1	G#2
D5-587	D2	D3	G#3-207		G#1

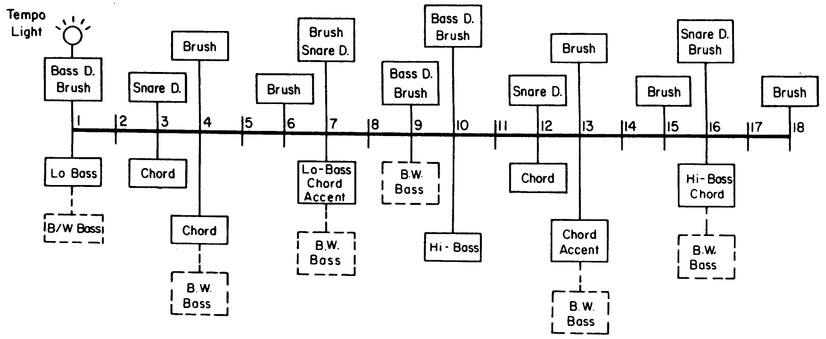
RHYTHM PATTERNS DIAGRAM

NOTE:

For Rhythms on this page and following page Strum Upbeat is coincident with Chord & Chord Accent pulse. Strum Downbeat is coincident with the Hi/Lo Bass Pulse or if B.W. Bass is on with the B.W. Bass Pulse, also Arpeggio is Triggered on every Rhythm Time Point.

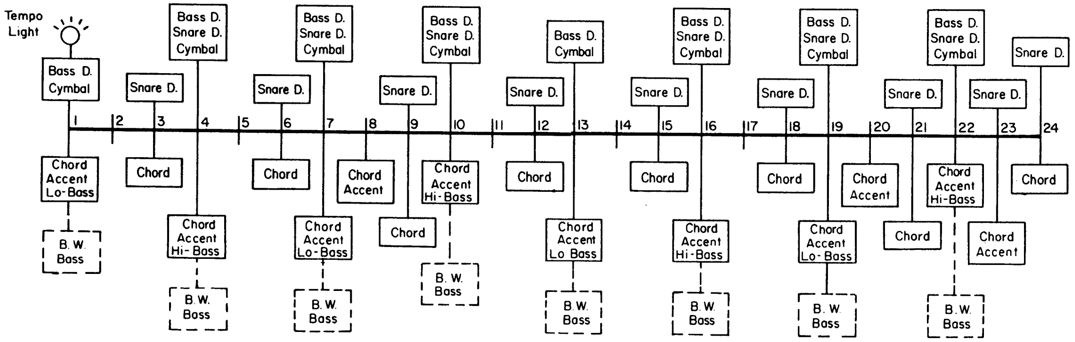
☐ Indicates functions with Magic Chord Tab on.

SWING WALTZ



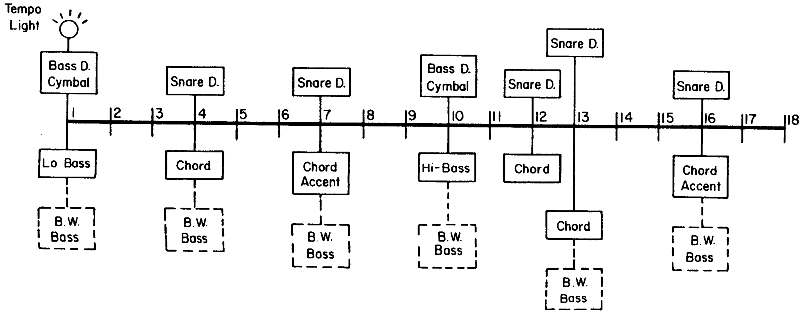
Tempo Light
Bass D. Brush
Snare D.
Brush
Brush
Brush Snare D.
Bass D. Brush
Bass D. Brush
Snare D.
Brush
Brush
Snare D. Brush
Brush
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
Lo Bass
B/W Bass
Chord
Chord
B.W. Bass
Lo-Bass Chord Accent
B.W. Bass
B.W. Bass
Hi-Bass
Chord
Chord Accent
B.W. Bass
Hi-Bass Chord
B.W. Bass

SWING MARCH



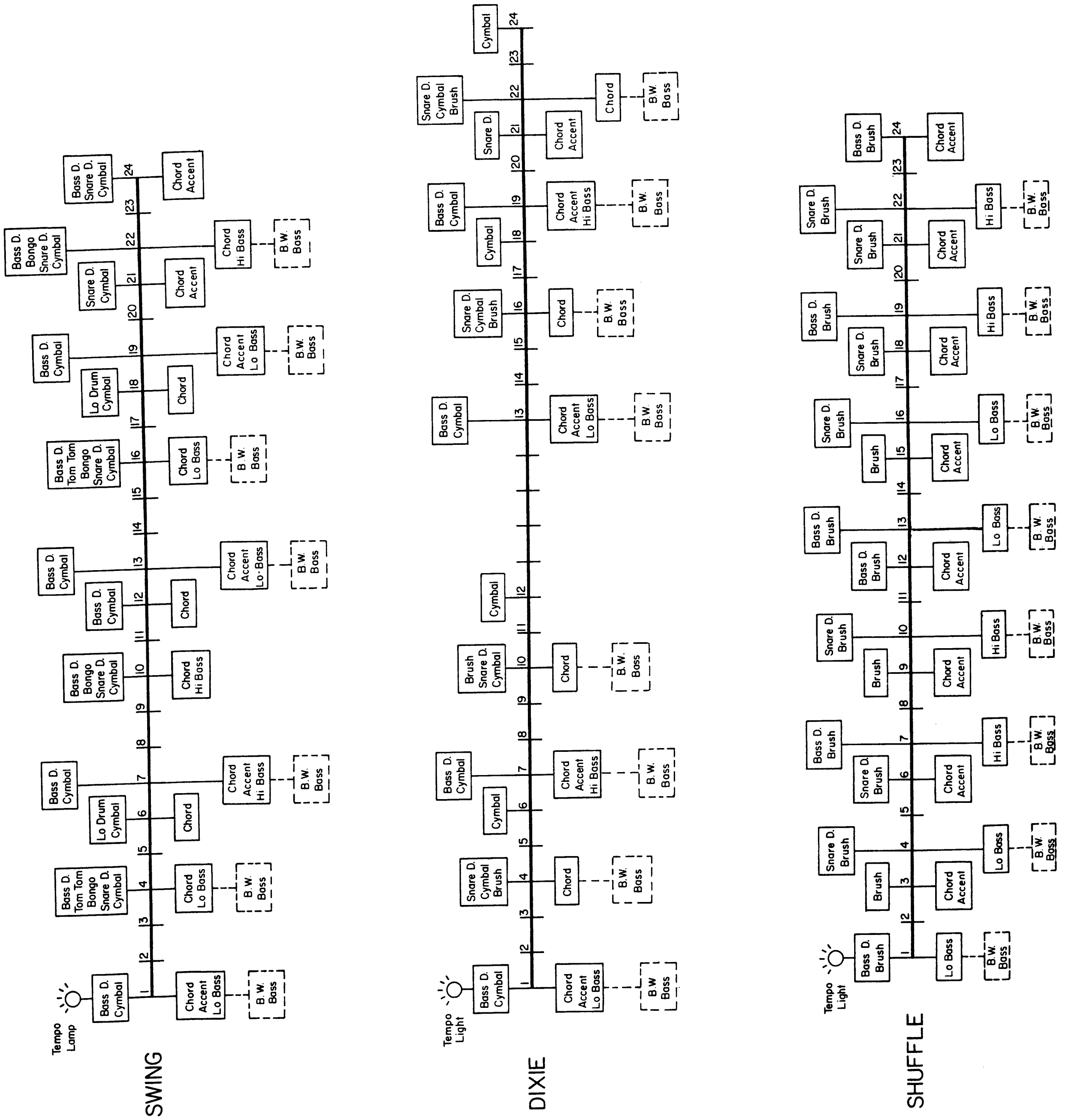
Tempo Light
Bass D. Cymbal
Snare D.
Bass D. Snare D. Cymbal
Snare D.
Bass D. Snare D. Cymbal
Snare D.
Bass D. Snare D. Cymbal
Snare D.
Bass D. Cymbal
Snare D.
Bass D. Snare D. Cymbal
Snare D.
Bass D. Snare D. Cymbal
Snare D.
Bass D. Snare D. Cymbal
Snare D.
Snare D.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
Chord Accent Lo-Bass
B.W. Bass
Chord
Chord Accent Hi-Bass
B.W. Bass
Chord
Chord Accent Lo-Bass
B.W. Bass
Chord Accent
Chord
Chord Accent Hi-Bass
B.W. Bass
Chord
Chord Accent Lo Bass
B.W. Bass
Chord
Chord Accent Hi-Bass
B.W. Bass
Chord
Chord Accent Lo-Bass
B.W. Bass
Chord Accent
Chord
Chord Accent Hi-Bass
B.W. Bass
Chord Accent
Chord

WALTZ



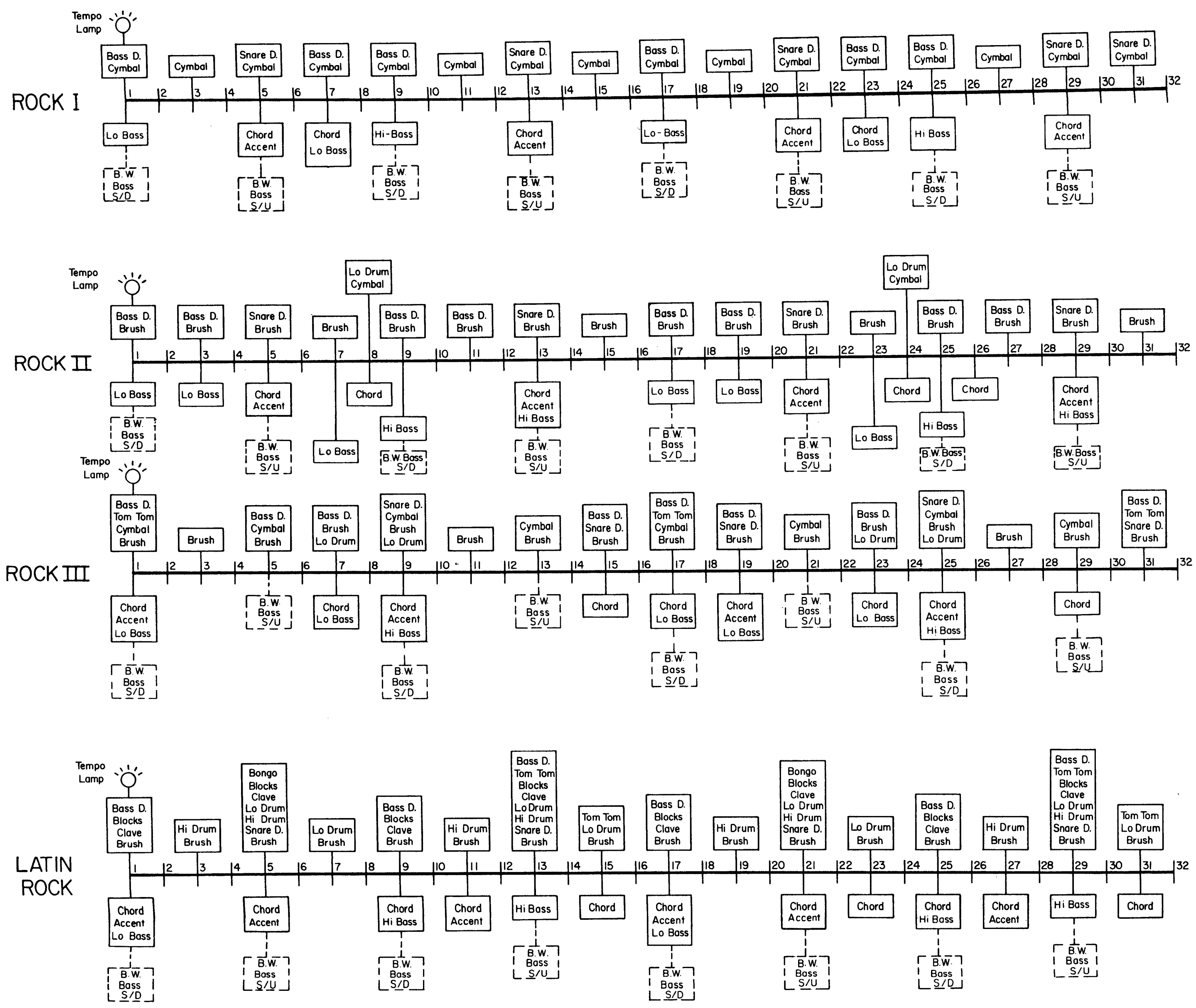
Tempo Light
Bass D. Cymbal
Snare D.
Snare D.
Bass D. Cymbal
Snare D.
Snare D.
Snare D.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
Lo Bass
B.W. Bass
Chord
B.W. Bass
Chord Accent
B.W. Bass
Hi-Bass
B.W. Bass
Chord
Chord
B.W. Bass
Chord Accent
B.W. Bass

RHYTHM PATTERNS DIAGRAM

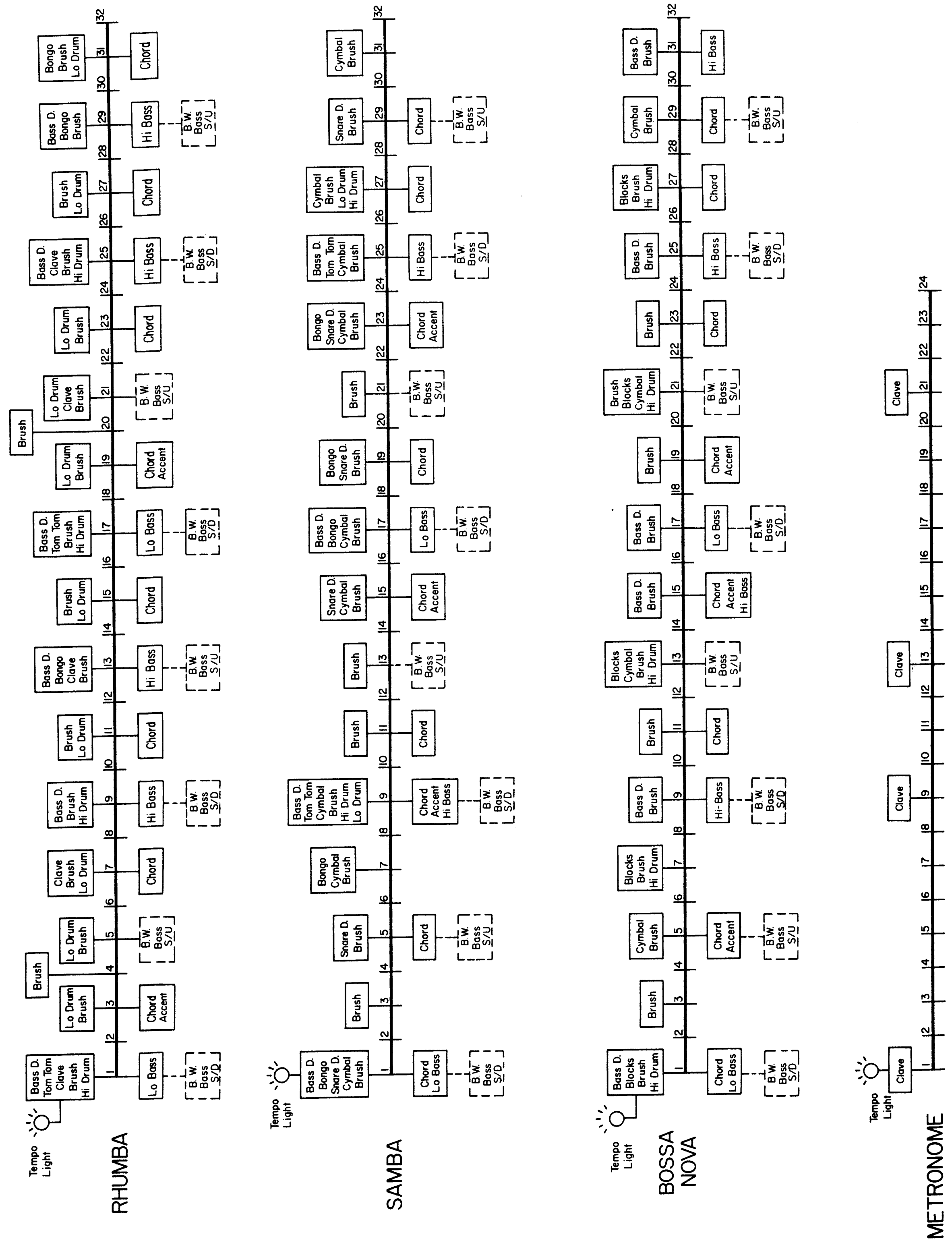

SWING
Tempo Lamp
Bass D. Cymbal
Chord Accent Lo Bass
B.W. Bass
Bass D. Tom Tom Bongo Snare D. Cymbal
Chord Lo Bass
Lo Drum Cymbal
Chord
Chord Accent Hi Bass
Bass D. Bongo Snare D. Cymbal
Chord Hi Bass
Snare D. Cymbal
Chord Accent
Bass D. Snare D. Cymbal
DIXIE
Tempo Light
Snare D. Cymbal Brush
Cymbal
Brush Snare D. Cymbal
Snare D.
Chord
SHUFFLE
Bass D. Brush
Lo Bass
Brush
Snare D. Brush
Hi Bass
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

RHYTHM PATTERNS DIAGRAM

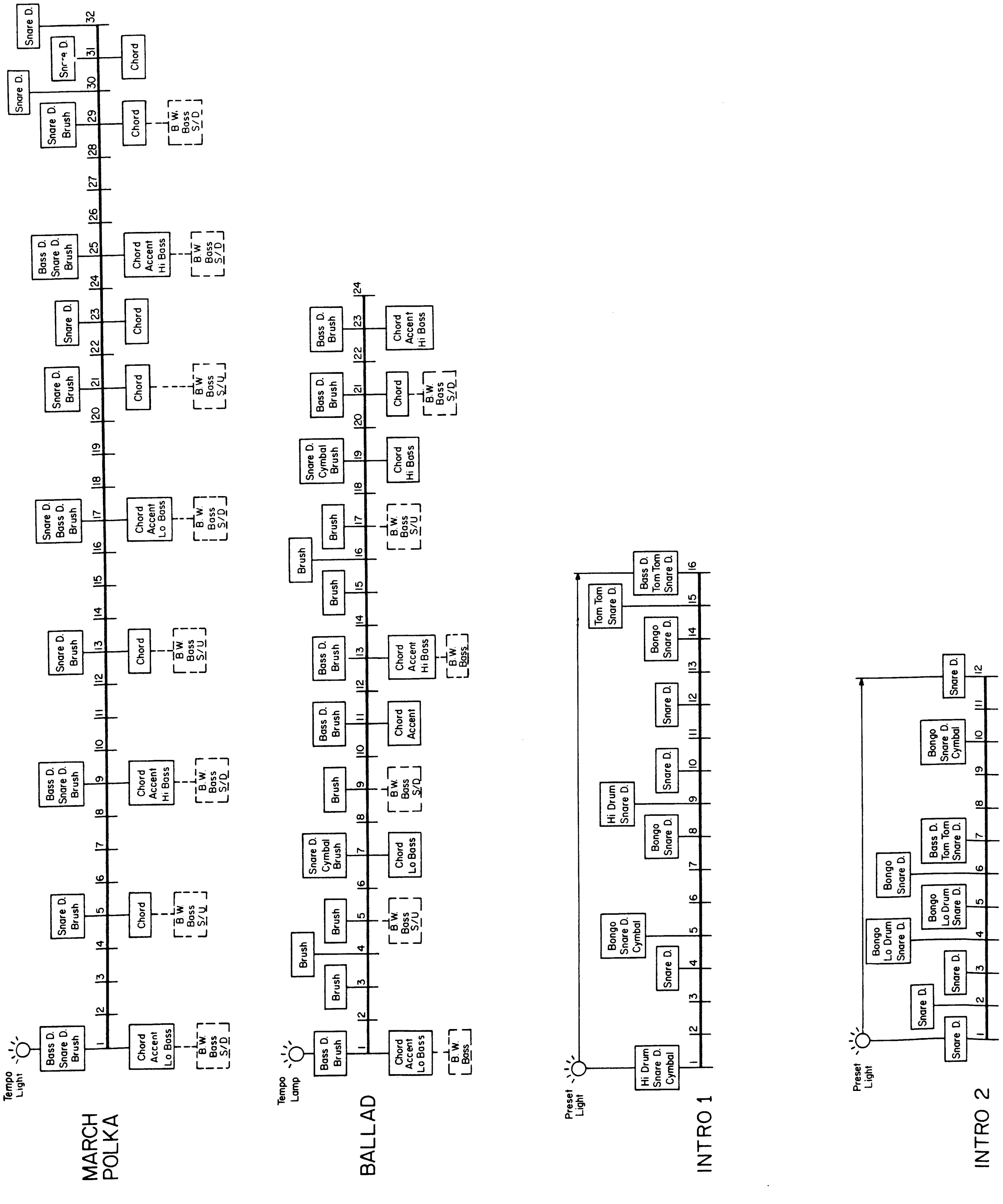
S/D= Strum Downbeat
S/U= Strum Upbeat
[dashed box] Indicates functions with magic Chord Tab on
NOTE. For the Rhythms on this page & following pages Arpeggio is Triggered on all odd numbered time pts.


ROCK I
Tempo Lamp
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Bass D. Cymbal
Cymbal
Snare D. Cymbal
Bass D. Cymbal
Bass D. Cymbal
Cymbal
Snare D. Cymbal
Cymbal
Bass D. Cymbal
Cymbal
Snare D. Cymbal
Bass D. Cymbal
Bass D. Cymbal
Cymbal
Snare D. Cymbal
Snare D. Cymbal
Lo Bass
B.W. Bass S/D
Chord Accent
B.W. Bass S/U
Chord Lo Bass
Hi-Bass
B.W. Bass S/D
Chord Accent
B.W. Bass S/U
Lo-Bass
B.W. Bass S/D
Chord Accent
B.W. Bass S/U
Chord Lo Bass
Hi Bass
B.W. Bass S/D
Chord Accent
B.W. Bass S/U
ROCK II
Tempo Lamp
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Bass D. Brush
Bass D. Brush
Snare D. Brush
Brush
Lo Drum Cymbal
Bass D. Brush
Bass D. Brush
Snare D. Brush
Brush
Bass D. Brush
Bass D. Brush
Snare D. Brush
Brush
Lo Drum Cymbal
Bass D. Brush
Bass D. Brush
Snare D. Brush
Brush
Lo Bass
B.W. Bass S/D
Lo Bass
Chord Accent
B.W. Bass S/U
Lo Bass
Chord
Hi Bass
B.W. Bass S/D
Chord Accent Hi Bass
B.W. Bass S/U
Lo Bass
B.W. Bass S/D
Lo Bass
Chord Accent
B.W. Bass S/U
Lo Bass
Chord
Hi Bass
B.W. Bass S/D
Chord
Chord Accent Hi Bass
B.W. Bass S/U
ROCK III
Tempo Lamp
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Bass D. Tom Tom Cymbal Brush
Brush
Bass D. Cymbal Brush
Bass D. Brush Lo Drum
Snare D. Cymbal Brush Lo Drum
Brush
Cymbal Brush
Bass D. Snare D. Brush
Bass D. Tom Tom Cymbal Brush
Bass D. Snare D. Brush
Cymbal Brush
Bass D. Brush Lo Drum
Snare D. Cymbal Brush Lo Drum
Brush
Cymbal Brush
Bass D. Tom Tom Snare D. Brush
Chord Accent Lo Bass
B.W. Bass S/D
B.W. Bass S/U
Chord Lo Bass
Chord Accent Hi Bass
B.W. Bass S/D
B.W. Bass S/U
Chord
Chord Lo Bass
B.W. Bass S/D
Chord Accent Lo Bass
B.W. Bass S/U
Chord Lo Bass
Chord Accent Hi Bass
B.W. Bass S/D
Chord
B.W. Bass S/U
LATIN ROCK
Tempo Lamp
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Bass D. Blocks Clave Brush
Hi Drum Brush
Bongo Blocks Clave Lo Drum Hi Drum Snare D. Brush
Lo Drum Brush
Bass D. Blocks Clave Brush
Hi Drum Brush
Bass D. Tom Tom Blocks Clave Lo Drum Hi Drum Snare D. Brush
Tom Tom Lo Drum Brush
Bass D. Blocks Clave Brush
Hi Drum Brush
Bongo Blocks Clave Lo Drum Hi Drum Snare D. Brush
Lo Drum Brush
Bass D. Blocks Clave Brush
Hi Drum Brush
Bass D. Tom Tom Blocks Clave Lo Drum Hi Drum Snare D. Brush
Tom Tom Lo Drum Brush
Chord Accent Lo Bass
B.W. Bass S/D
Chord Accent
B.W. Bass S/U
Chord Hi Bass
B.W. Bass S/D
Chord Accent
Hi Bass
B.W. Bass S/U
Chord
Chord Accent Lo Bass
B.W. Bass S/D
Chord Accent
B.W. Bass S/U
Chord
Chord Hi Bass
B.W. Bass S/D
Chord Accent
Hi Bass
B.W. Bass S/U
Chord

RHYTHM PATTERNS DIAGRAM


RHUMBA
Tempo Light
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Bass D. Tom Tom Clave Brush Hi Drum
Lo Bass
B.W. Bass S/D
Lo Drum Brush
Chord Accent
Brush
Lo Drum Brush
B.W. Bass S/U
Clave Brush Lo Drum
Chord
Bass D. Brush Hi Drum
Hi Bass
B.W. Bass S/D
Brush Lo Drum
Chord
Bass D. Bongo Clave Brush
Hi Bass
B.W. Bass S/U
Brush Lo Drum
Chord
Bass D. Tom Tom Brush Hi Drum
Lo Bass
B.W. Bass S/D
Lo Drum Brush
Chord Accent
Brush
Lo Drum Clave Brush
B.W. Bass S/U
Lo Drum Brush
Chord
Bass D. Clave Brush Hi Drum
Hi Bass
B.W. Bass S/D
Brush Lo Drum
Chord
Bass D. Bongo Brush
Hi Bass
B.W. Bass S/U
Bongo Brush Lo Drum
Chord
SAMBA
Tempo Light
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Bass D. Bongo Snare D. Cymbal Brush
Chord Lo Bass
B.W. Bass S/D
Brush
Snare D. Brush
Chord
B.W. Bass S/U
Bongo Cymbal Brush
Bass D. Tom Tom Cymbal Brush Hi Drum Lo Drum
Chord Accent Hi Bass
B.W. Bass S/D
Brush
Chord
Brush
B.W. Bass S/U
Snare D. Cymbal Brush
Chord Accent
Bass D. Bongo Cymbal Brush
Lo Bass
B.W. Bass S/D
Bongo Snare D. Brush
Chord
Brush
B.W. Bass S/U
Bongo Snare D. Cymbal Brush
Chord Accent
Bass D. Tom Tom Cymbal Brush
Hi Bass
B.W. Bass S/D
Cymbal Brush Lo Drum Hi Drum
Chord
Snare D. Brush
Chord
B.W. Bass S/U
Cymbal Brush
BOSSA NOVA
Tempo Light
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Bass D. Blocks Brush Hi Drum
Chord Lo Bass
B.W. Bass S/D
Brush
Cymbal Brush
Chord Accent
B.W. Bass S/U
Blocks Brush Hi Drum
Bass D. Brush
Hi-Bass
B.W. Bass S/D
Brush
Chord
Blocks Cymbal Brush Hi Drum
B.W. Bass S/U
Bass D. Brush
Chord Accent Hi Bass
Bass D. Brush
Lo Bass
B.W. Bass S/D
Brush
Chord Accent
Brush Blocks Cymbal Hi Drum
B.W. Bass S/U
Brush
Chord
Bass D. Brush
Hi Bass
B.W. Bass S/D
Blocks Brush Hi Drum
Chord
Cymbal Brush
Chord
B.W. Bass S/U
Bass D. Brush
Hi Bass
METRONOME
Tempo Light
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Clave
Clave
Clave
Clave

RHYTHM PATTERNS DIAGRAM


MARCH POLKA
Tempo Light
Bass D. Snare D. Brush
Chord Accent Lo Bass
B.W. Bass S/D
Snare D. Brush
Chord
B.W. Bass S/U
Bass D. Snare D. Brush
Chord Accent Hi Bass
B.W. Bass S/D
Snare D. Brush
Chord
B.W. Bass S/U
Snare D Bass D. Brush
Chord Accent Lo Bass
B.W. Bass S/D
Snare D. Brush
Chord
B.W. Bass S/U
Snare D.
Chord
Bass D. Snare D. Brush
Chord Accent Hi Bass
B.W. Bass S/D
Snare D. Brush
Chord
B.W. Bass S/D
Snare D.
Snare D.
Chord
Snare D.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
BALLAD
Tempo Lamp
Bass D. Brush
Chord Accent Lo Bass
B.W. Bass
Brush
Brush
Brush
B.W. Bass S/U
Snare D. Cymbal Brush
Chord Lo Bass
Brush
B.W. Bass S/D
Bass D. Brush
Chord Accent
Bass D. Brush
Chord Accent Hi Bass
B.W. Bass
Brush
Brush
Brush
B.W. Bass S/U
Snare D. Cymbal Brush
Chord Hi Bass
Bass D. Brush
Chord
B.W. Bass S/D
Bass D. Brush
Chord Accent Hi Bass
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
INTRO 1
Preset Light
Hi Drum Snare D. Cymbal
Snare D.
Bongo Snare D. Cymbal
Bongo Snare D.
Hi Drum Snare D.
Snare D.
Snare D.
Bongo Snare D.
Tom Tom Snare D.
Bass D. Tom Tom Snare D.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
INTRO 2
Preset Light
Snare D.
Snare D.
Snare D.
Bongo Lo Drum Snare D.
Bongo Lo Drum Snare D.
Bongo Snare D.
Bass D. Tom Tom Snare D.
Bongo Snare D. Cymbal
Snare D.
1 2 3 4 5 6 7 8 9 10 11 12

PARTS INFORMATION

STANDARD PARTS

Replacements for all standard electronic parts and hardware may be purchased directly from local suppliers generally in less time than would be required to obtain them from the factory.

SPECIAL PARTS

In addition to the standard replacement parts, special electronic and mechanical parts are also used. These parts are manufactured by and to the specifications of the factory. Order these parts directly from the factory since they would be difficult or impossible to obtain from other sources.

PARTS ORDERING INFORMATION

When ordering parts be sure to include the following information:

1. Model and Serial Number
2. Part Number
3. A description of the part
4. Specify how you want the part shipped.

Most special electronic parts and mechanical parts will have a part number stamped on them. In the event that the part number is missing, or you are unable to read the part number, a complete description of the part and where it is used will allow the factory to fill your parts order. When parts are ordered in the proper manner the factory is able to fill your orders promptly—delays that might result are avoided.

ADDRESS PARTS ORDERS TO:

LOWREY ELECTRONICS SERVICE DEPT.
4400 W. 45th St.
Chicago, Illinois 60632

IMPORTANT

IN ANY CORRESPONDENCE CONCERNING THIS INSTRUMENT ALWAYS INCLUDE MODEL AND SERIAL NUMBERS

PARTS LIST

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THE PARTS LIST CONTAINS THE FOLLOWING INFORMATION:

1. Name of Part
2. Value, Tolerance and Code (When Important)
3. Brief description
4. Where the part is found (assembly, printed circuit board, etc.)
5. Schematic Reference Number
6. PART NUMBER — USE IT!

This parts list includes all standard stock replacement parts. No attempt has been made to include every nut, bolt and screw. If the necessity for a non-listed part arises, please write describing the parts location and function as well as model and serial number of the unit.

PARTS LIST

AOC & KEYER BOARD ASSEMBLY

Part	Description	Schematic Reference	Part Number
Capacitor	Electrolytic 30 UF 25V Dual		945-022781
Capacitor	Electrolytic 2 UF 30V Dual		945-024186
Diode		D16, 96-108, 178	919-004799
Potentiometer	5K AOC Range Adjustment	VR17	925-004349-5
Transistor		Q95	991-020425-3
Transistor	PNP	Q94, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119	991-010098
Transistor		Q96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118	991-008393

AMPLIFIER/POWER SUPPLY & EXPRESSION PEDAL ASSEMBLY

Part	Description	Schematic Reference	Part Number
Actuator	Arm		967-015934
Assembly	Control Arm		997-016060
Assembly	Pedal & Glide Switch		997-023133
Assembly	Pedal & Mat		997-023127
Bulb	GE 1819		939-003190
Capacitor	Electrolytic 15 UF 6V		945-008895-79
Capacitor	Electrolytic 1 UF 35V		945-008895-86
Capacitor	Electrolytic 3 UF 50V		945-008895-6
Capacitor	Crossover 35 UF 35V NP		945-002918-1
Capacitor	Crossover 100 UF 35V NP		945-001932-1
Capacitor	Electrolytic 1000-1000 40V NP		945-022771
Capacitor	Electrolytic 6000-40		945-025571
Capacitor	Electrolytic 500 Dual 40V		945-024505
Capacitor	Electrolytic 2 UF 20V NP		945-008895-32
Capacitor	Electrolytic 25 UF 15V		945-008895-29
Capacitor	Electrolytic 10 UF 45V		945-008895-85
Coil	Crossover 3.7 mh	L12	956-024553
Cord	Power		989-008717
Diode		D185, 187	919-010623
Diode	Triple	D184	919-010454-1
Diode	Bridge 15 Amps	D180	919-025522-3
Diode		D182, 183, 186	919-004799
Diode	Zener 14V 5%	Z2	919-017406-65
Diode	Zener 10V 5%	Z3	919-017406-57
Diode	Zener 5.1V 5%	Z1	919-017406-58
Fuse	Slo-Blo 3.2 Amp Pigtail		939-001120-1
IC	24V Voltage Regulator	IC47	992-024149-13
Mat	Swell Pedal		959-022953
Pedal	Expression		964-022202
Photocell	Expression Pedal	P2	948-018479
Potentiometer	Maximum Organ Volume Adjustment 25K	VR20	925-021442-14
Potentiometer	Minimum Organ Volume Adjustment 500K	VR21	925-024590
Relay			921-024167
Resistor	Fusible 1.9 Ohm 5W		924-024557-2
Resistor	WW 150 Ohm 2W		924-010471-151
Resistor	WW .51 Ohm 5W		924-008896
Resistor	WW 560 Ohm 2W		924-010471-561

PARTS LIST

Part	Description	Schematic Reference	Part Number
AMPLIFIER/POWER SUPPLY & EXPRESSION PEDAL ASSEMBLY (Continued)			
Spring	Compression		975-011747-1
Spring	Glide Switch		975-022949
Transformer	Power	T1	954-024166
Transistor	Darlington	Q137	991-013543
Transistor	Darlington	Q126	991-016727
Transistor	Power	Q135, 136	992-024185
Transistor	Regulator PNP	Q122	992-022773
Transistor	Darlington	Q129	991-015663
Transistor		Q130, 131	991-013544
Transistor	PNP Pre-Driver	Q132	991-024184
Transistor	PNP Driver	Q134	991-020426-3
Transistor	Driver	Q133	991-020425-3
BASS PEDAL ASSEMBLY			
Cap	Black Pedal		915-003863
Cap	Dark Brown Pedal		915-003856
Spring	Compression		975-005811
Spring	Contact		917-009155
BENCH ASSEMBLY			
Bench	Walnut		978-024193
CHORD FUNCTION GENERATOR ASSEMBLY			
Capacitor	Electrolytic 2x2 UF 30V		945-024186
Capacitor	Electrolytic 25 UF 25V	C30	945-008895-8
Capacitor	Tantalum 5.6 UF 25V		946-021452-1
Capacitor	Tantalum .22 UF 35V		946-012624-224
Capacitor	Tantalum 1 UF 35V		946-012624-105
Diode		D318-330, 333-340, 343-357	919-024769
IC	Quad Dual Input AND Gate	IC52	991-025517
IC	Quad Dual Input NAND Gate	IC53	991-025515
IC	Quad Dual Input NAND Gate	IC54	991-024593
IC	Quad Dual Input OR Gate	IC50, 51	991-025516
IC	Dual D Flip Flops	IC55, 56	991-025225
IC	Chord Function Generator	IC49	991-026003
Network	23-Pin Strum Keying		949-024737
Potentiometer	50K Chord Level Adjustment	VR37	925-004349-7
Socket	IC 14-Pin		906-018905
Socket	IC 40-Pin		906-022727
Transistor	Preamps	Q227-229	991-002298
Transistor		Q210-215,217,218,223, 224,226,230,231	991-002232
CHORUS MODULATOR BOARD ASSEMBLY			
Capacitor	Electrolytic 100 UF 25V	C4, 6, 8	945-008895-045
Capacitor	Electrolytic 200 UF 25V	C9	945-008895

PARTS LIST

CHORUS MODULATOR BOARD ASSEMBLY (Continued)

Part	Description	Schematic Reference	Part Number
Capacitor	Electrolytic 6 UF 20V		945-008895-7
Capacitor	Electrolytic 1 UF 35V NP		945-008895-15
Capacitor	Electrolytic 100 UF 10V	C1	945-008895-20
Capacitor	Electrolytic 20 MFD 25V		945-008895-30
Capacitor	Electrolytic 2 UF 20V NP		945-008895-32
Capacitor	Electrolytic 500 UF 18V	C2	945-008895-80
Capacitor	Tantalum 5.6 UF 25V		946-021452-1
Diode		D370-372	919-004799
IC	Bucket Brigades	IC68, 70, 72	991-020077-1
IC	Volume Regulators	IC41, 42	991-021444-1
IC	Voltage Controlled Oscillator	IC67, 69, 71	991-024543
Network			949-020068
Potentiometer	2500 Ohm Phase 1, 2, 3 Level Adjustment	VR42-44	925-004349-11
Potentiometer	250K Clock 1 Speed Adjustment	VR41	925-004349-2
Potentiometer	500K Clock 2 Speed Adjustment	VR40	925-004349-8
Socket	IC 8-Pin		906-021448
Socket	IC 6-Pin		906-021448-1
Transistor		Q238,239,257,265,273	991-002298
Transistor	Oscillator	Q241,242-248,251,259,267	991-008393
Transistor		Q252-254,260-262,268-270	991-010462
Transistor	Darlington	Q250,255,256,258,263,264,266,271,272	991-013543
Transistor	Clock 1 & 2	Q240, 249	991-015316

CONSOLE ASSEMBLY

Part	Description	Schematic Reference	Part Number
IC	12V Voltage Regulator	IC48	992-024149-8
Jack	Auxiliary		906-006104
Key Cap (1)	Plastic (Black)		
Key Cap (2)	Plastic (White)		
Key (3)	Complete (Black or White)		

(1) All are identical.
(2) Include Key Letter designation. (Example: A or F, etc.)
(3) Available on special order only. Include Key Letter designation and Key location. Replacement keys will require special hand-fitting due to the hand-built construction of keyboards.

Part	Description	Schematic Reference	Part Number
Speaker	10-inch Bass Main & Leslie		985-024183
Speaker	6-inch x 9-inch Channel 1 & 2 String		985-009960-2
Speaker	8-inch Main		985-003185-3

DC CONTROL BOARD ASSEMBLY

Part	Description	Schematic Reference	Part Number
Capacitor	Electrolytic 25 UF 25V	C17	945-008895-8
Capacitor	Electrolytic 10 UF 20V		945-008895-9
Capacitor	Electrolytic 2 UF 25V		945-015619
Capacitor	Tantalum 3.3 UF 35V		946-012624-335
Capacitor	Tantalum 4.7 UF 35V		946-012624-475

PARTS LIST

Part	Description	Schematic Reference	Part Number
DC CONTROL BOARD ASSEMBLY (Continued)			
Capacitor	Tantalum 5.6 UF 25V		946-021452-1
Diode		D1, 2, 9, 11-15, 21-80, 138-140	919-004799
IC	Set-Reset Flip-Flop	IC15	991-024542
Potentiometer	10K Wow Rest Adjustment	VR5	925-004349-3
Potentiometer	100K Vibrato Speed Adjustment	VR2	925-004349-10
Socket	14-Pin		906-018905
Transistor	PNP	Q15, 18, 49	991-020426-1
Transistor		Q16,17,25,31,50,51,53	991-002232
Transistor		Q1,2,4,6,7,9,10,19-21, 27,30,32-34	991-008393
Transistor	PNP	Q28, 29	991-010098
Transistor		Q3	991-013544
Transistor	Darlington	Q5,22-24,26,35,52,54	991-016727
DIODE READOUT BOARD ASSEMBLY			
Diode		D17-20, 136, 137	919-004799
Network	Keying 8-Pin		949-022778
Network	Keying 14-Pin		949-022779
FLUTE FILTER BOARD ASSEMBLY			
Capacitor	Electrolytic 4 UF 35V NP		945-008895-16
Capacitor	Electrolytic 20 MFD 25V	C31	945-008895-30
Capacitor	Electrolytic 1 UF 25V NP		945-008895-41
Capacitor	Electrolytic 100 UF 15V	C24	945-008895-44
Capacitor	Electrolytic 2 UF 50V		945-008895-65
Capacitor	Electrolytic 25 UF 25V	C25	945-008895-8
Capacitor	Electrolytic 10 UF 20V	C21	945-008895-9
Capacitor	Electrolytic 350 UF 15V	C23	945-008895-42
Capacitor	Tantalum 5.6 UF 25V		946-021452-1
Capacitor	Tantalum 27 UF 35V		946-012624-276
Diode		D82-93, 142, 143	919-004799
IC		IC40	991-021444-1
IC		IC16-30	991-024103
Network			949-024537
Photocell	Tremolo	P1	948-001859
Socket	14-Pin		906-018905
Socket	8-Pin		906-021448
Transistor		Q46, 47, 128	991-002298
Transistor		Q37-45, 56, 57	991-022774
LESLIE TREMOLO UNIT			
Assembly	Motor and Bracket		019638
Assembly	Motor with Pulley		019661
Belt			021048
Bushing	Black Rubber		019463
Drum	Styrene		019794
Shaft	Rotor with Pulley		019745
Speaker	8” 8 Ohm		985-003185

PARTS LIST

Part	Description	Schematic Reference	Part Number
LOWER KEYSWITCH BOARD ASSEMBLY			
Actuator	Keyswitch		964-024116
Coil	70 UH	L5	956-018877
Diode		D290-317	919-024769
Spring	Contact		917-009155
Spring	Pull Down		975-007085
MAGIC GENIE 4-FOOT TOS, AOC & OSCILLATOR BOARD ASSEMBLY			
Capacitor	Electrolytic 10 UF 15V		945-019366-3
Capacitor	Electrolytic 10 UF 20V		945-008895-9
Capacitor	Electrolytic 25 UF 15V	C15	945-008895-29
Capacitor	Polystyrene 200P 5% 63V		946-024767-5
Coil	Chord Tuning Adjustment	L30	952-018874-6
Diode		D342	919-010873
Diode	Glide	D341	919-024117
Diode		D331, 332, 358-361	919-004799
IC	TOS	IC62	992-018813-2
IC	TOS	IC63	992-018813-1
IC	Dual D Flip-Flop	IC57, 58, 59, 61	991-025225
IC	4-Foot & AOC Decoder 32 Bit Shift Register	IC60	991-022793
Network	4-Foot TOS 22K		949-025521-1
Network	4-Foot TOS 100K		949-025521-2
Network	Genie Squelch 470K		949-025521-3
Resistor	WW 220 Ohm 2W		924-010471-221
Socket	IC 14-Pin		906-018905
Socket	IC 40-Pin		906-022727
Transistor	Darlington	Q216	991-016727
Transistor		Q219-222, 225	991-002232
REED STRING QUALITY CONTROL BOARD ASSEMBLY			
Capacitor	Electrolytic 100 UF 25V	C26	945-008895-45
Capacitor	Electrolytic 75 UF 10V	C28, 33	945-024539
Capacitor	Electrolytic 10 UF 20V	C29	945-008895-9
Capacitor	Electrolytic 1 UF 20V		945-008895-11
Capacitor	Electrolytic 1 UF 35V NP		945-008895-015
Capacitor	Electrolytic 2 UF 20V NP		945-008895-32
Capacitor	Electrolytic 500 UF 18V	C27	945-008895-80
Capacitor	Tantalum 5.6 UF 25V		946-021452-1
Capacitor	Tantalum 2.2 UF 25V		946-012624-225
Coil	Toroid 100 mh	L7	952-021447-5
Coil	Toroid 500 mh	L8	952-021447-8
Diode		D144-146, 148-150	919-004799
IC		IC31, 34, 36, 37, 39	991-021444-1
IC		IC33, 35	991-024103
Network	Trumpet Filter		949-024537
Potentiometer	50K Percussion Thump Adj./Genie Thump Adj.	VR11, 15	925-004349-7
Socket	14-Pin		906-018905
Socket	8-Pin		906-021448
Transistor		Q59,65,66,68-70,73,92, 125,127	991-002298

PARTS LIST

Part	Description	Schematic Reference	Part Number
REED STRING QUALITY CONTROL BOARD ASSEMBLY (Continued)			
Transistor	Darlington	Q60, 67, 74	991-016727
Transistor		Q123, 124	991-018047
Transistor	FET	Q58, 62-64	991-022774
Transistor	Darlington	Q71, 72	991-013543
REVERB ASSEMBLY			
Reverb	Protector		908-003573
Reverb	Unit		984-017447
RHYTHM CLOCK BOARD ASSEMBLY			
Capacitor	Electrolytic 1000 UF 15V	C11	945-008895-61
Diode		D166-170,190-201,206-264	919-004799
IC	Resetable Counter	IC44	991-018495
IC	ROM.	IC45	991-022729
Socket	40-Pin		906-022727
Socket	16-Pin		906-018905-1
Transistor		Q81-84,87,143,145-152,158,160,163,164,172	991-008393
Transistor	PNP	Q85, 139, 140, 155-157,159,161,162,165-171	991-010098
Transistor	Darlington	Q86, 144	991-016727
Transistor		Q141, 142	991-018493
Transistor		Q173	991-002232
RHYTHM INSTRUMENTATION BOARD ASSEMBLY			
Capacitor	Electrolytic 50 UF 15V	C20	945-008895-5
Capacitor	Electrolytic 1 UF 20V		945-008895-11
Capacitor	Electrolytic 8 UF 35V NP		945-008895-14
Capacitor	Electrolytic 2 UF 20V NP		945-008895-32
Capacitor	Electrolytic 1 UF 25V NP		945-008895-41
Capacitor	Electrolytic 100 UF 15V	C10.	945-008895-44
Capacitor	Electrolytic 350 UF 25V	C19.	945-008895-84
Coil	Toroid 5 H	L16.	952-021447-1
Coil	Toroid 10 H	L13, 14, 17	952-021447-2
Coil	Toroid 1.5 H	L15	952-021447-3
Coil	Toroid 500 mh	L18, 19.	952-021447-8
Coil	27 mh.	L20, 21, 22, 23.	952-016273
Diode		D202-205, 266-283	919-004799
Network	Noise Voicing		949-022991
Potentiometer	50K Cymbal, Snare & Brush Adjustment	VR26, 27, 28	925-004349-7
Transistor		Q176-183, 187, 194, 198, 198	991-002298
Transistor		Q88, 154, 184, 189, 190-193, 195-197, 200	991-008393
Transistor	PNP	Q153	991-010098
Transistor		Q188	991-013544
Transistor	Darlington	Q186	991-016727

PARTS LIST

TAB PANEL ASSEMBLY

Part	Description	Schematic Reference	Part Number
Assembly	Pushbutton switch		960-024525
Guide	Slider		976-005170-1
Jack	Headphone		910-024526
Knob			915-024114
Lens	White		922-018413-1
Potentiometer	10K	VR7, 19, 29	925-021442-7
Potentiometer	100K	VR3, 6	925-021442-9
Potentiometer	1.5M	VR8	925-021442-11
Potentiometer	5K	VR1	925-021442-8
Potentiometer	10K	VR9, 10, 12, 14, 35, 36	925-021442-12
Potentiometer	1M	VR23	925-021442-10
Potentiometer	100K	VR30	925-021442-13
Pushbutton	Red Variegated		915-024199-8
Pushbutton	Yellow Variegated		915-024199-9
Pushbutton	Black		915-024199-17
Pushbutton	Green Variegated		915-024199-6
Pushbutton	White Pearl		915-024199-7
Pushbutton	Gray Variegated		915-024199-5
Pusher	Medium		964-024548
Pusher	Short		964-001903
Pusher	Short		964-001906
Spring	Contact		917-005166-1
Spring	Toggle		975-002338-1
Switch	Chorus On/Off (Yellow)		960-010669-3
Switch	Leslie On/Off (White)		960-010669-4
Switch	Power On/Off		960-010669
Tab	AOC		915-009876-152
Tab	Accordion		915-009876-296
Tab	Banjo		915-009876-272
Tab	Bass Full		915-009876-287
Tab	Bass Soft/Med		915-009876-299
Tab	Boogie Woogie Bass		915-009876-340
Tab	Cello 16		915-009876-243
Tab	Chord Hold		915-009876-332
Tab	Electric Piano		915-009876-321
Tab	Flute 16		915-009876-218
Tab	Flute 8		915-009876-219
Tab	Flute 5-1/3		915-009876-305
Tab	Flute 4		915-009876-246
Tab	Flute 2-2/3		915-009876-221
Tab	Flute 2		915-009876-322
Tab	Flute Preset		915-009876-323
Tab	Genie Voices Normal Organ		915-009876-297
Tab	Guitar Bass		915-009876-276
Tab	Guitar		915-009876-324
Tab	Guitar Strum		915-009876-331
Tab	Harmonic 4		915-009876-216
Tab	Harmonic 2-2/3		915-009876-217
Tab	Harpsichord		915-009876-278
Tab	Harpsichord Arpeggio		915-009876-335
Tab	Hawaiian Guitar		915-009876-271

PARTS LIST

TAB PANEL ASSEMBLY (Continued)

Part	Description	Schematic Reference	Part Number
Tab	Kinura 8		915-009876-237
Tab	Magic Genie Chords On		915-009876-329
Tab	Mandolin		915-009876-279
Tab	Oboe		915-009876-236
Tab	Orchestra Clarinet		915-009876-315
Tab	Pedal 8, 16-8		915-009876-222
Tab	Pedal String Bass/Guitar Bass		915-009876-301
Tab	Pedal Sustain On/Off		915-009876-249
Tab	Pedal Wow		915-009876-317
Tab	Percuss Repeat On		915-009876-190
Tab	Percuss Short-Long		915-009876-191
Tab	Piano		915-009876-282
Tab	Piano Arpeggio		915-009876-336
Tab	Piccolo		915-009876-310
Tab	Rhythm Start		915-009876-313
Tab	Rhythm Start Normal/Auto		915-009876-293
Tab	String Bass		915-009876-284
Tab	Strum/Upbeat/Downbeat		915-009876-338
Tab	Sustain		915-009876-314
Tab	Symphonic Wow		915-009876-316
Tab	Symphonic Wow Attack Slow		915-009876-312
Tab	Trombone 16		915-009876-233
Tab	Trumpet 16		915-009876-319
Tab	Ukulele		915-009876-318
Tab	Ukulele Strum		915-009876-339
Tab	Vibes		915-009876-308
Tab	Vibra Harp		915-009876-285
Tab	Vibrato		915-009876-290
Tab	Viola 8		915-009876-241
Tab	Violin		915-009876-307
Tab	Violina 4		915-009876-320

TONE GENERATOR & PEDAL BOARD ASSEMBLY

Part	Description	Schematic Reference	Part Number
Capacitorq	Electrolytic 25 UF 15V	C12	945-008895-29
Capacitor	Electrolytic 25 UF 25V	C18	945-008895-8
Capacitor	Electrolytic 1 UF 20V		945-008895-11
Capacitor	Electrolytic 4 UF 35V NP		945-008895-16
Capacitor	Polystyrene 150 PF 33V		946-013181-151
Capacitor	Tantalum .22 UF 35V		946-012624
Capacitor	Tantalum 1.0 UF 35V		946-021452-2
Capacitor	Tantalum 5.6 UF 25V	C32	946-021452-1
Capacitor	Tantalum 10 UF 35V	C13	946-021452-5
Coil	Tuning Adjustment 28uh	L1	952-018874-2
Diode		D4,6,7,152-157,171-175	919-004799
Diode		D5	919-010873
Diode	Glide	D3	919-024117
IC	Dividers	IC3-14	991-021331-2
IC	TOS	IC1	991-018813-1
IC	TOS	IC2	991-018813-2
Network	Generator		949-024536

PARTS LIST

Part	Description	Schematic Reference	Part Number

TONE GENERATOR & PEDAL BOARD ASSEMBLY (Continued)

Part	Description	Schematic Reference	Part Number
Resistor	WW 220 Ohm 2W		924-010471-221
Socket	14-Pin		906-018905
Transistor		Q8, Q77, Q89	991-002232
Transistor		Q76	991-008393
Transistor	PNP	Q79	991-010098
Transistor	Darlington	Q80, 90, 91	991-016727
Transistor	Master Oscillator, Buffers	Q11, 12, 13	991-025535

UPPER MANUAL KEYSWITCH ASSEMBLY

Part	Description	Schematic Reference	Part Number
Actuator	Keyswitch		964-024116
Clip	Spring		976-009364-2
Spring	Contact		917-022999
Spring	Pull down		975-007085